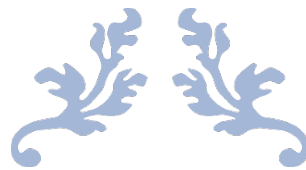


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ITTO PD 737/14 Rev.2(I)

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Developing Supply Capacity of Wood-Based Biomass Energy through Improved Enabling Conditions and Efficient Utilization of Degraded Forest Lands involving Local Communities in North Sumatra Province of Indonesia



Ex-Post Evaluation Report

Prepared by

Dr. Gan Kee Seng

JUNE 30, 2023

## List of Abbreviations

<u>Abbreviation</u>	<u>Description</u>
DG PHPL	Directorate General Of Sustainable Production Forest Management (Pengelolaan Hutan Produksi Lestari)
EFD	Energy Forest Development
EFP	Energy Forest Plantation
FMU	Forest Management Unit
FRI	Forest Research and Innovation
FTR	Final Technical Report
GOI	Government of Indonesia
ISWA	Indonesian Sawmill and Woodworking Association
ITTO	International Tropical Timber Organization
LFM	Logical Framework Matrix
MoEF	Ministry of Environment and Forestry
MoEMR	Ministry of Energy Mineral Resources
NGO	Non-Government Organization
NSPFA	North Sumatera Provincial Forestry Agency
PHL	Sustainable Production Forest Management (Pengelolaan Hutan Produksi Lestari)
PMU	Project Management Unit
PSC	Project Steering Committee
R & D	Research and Development
SCF	Stakeholder Consultation Forum
UHP	Production Forest Development (Usaha Hutan Produksi)
YPO	Yearly Plan of Operation

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I should also convey my sincere appreciation to Ms Rina Kristanti of Sustainable Production Forest Management (PHL Indonesia) for receiving me to discuss on the different aspects of the project and arrangement for field visit and meetings with the various project stakeholders.

Consultant

# Executive Summary

## Introduction

1. The Committee on Economic, Statistics and Markets and the Committee on Forest Industry, during their Fifty-sixth Session in November 2022 decided that an ex-post evaluation of PD 737/14 Rev.2 (I) “Developing Supply Capacity of Wood-Based Biomass Energy through Improved Enabling Conditions and Efficient Utilization of Degraded Forest Lands involving Local Communities in North Sumatra Province of Indonesia” to be conducted in order to establish how well the Project served its purposes and to draw up recommendations for future action.

2. PD 737/14 Rev.2 (I) had been implemented by the Government of Indonesia (GOI) with Directorate of Production Forest Development (UHP) of Directorate General of Sustainable Management of Production Forests (DG PHPL), Ministry of Environment and Forestry, Indonesia as the executing agency and Indonesian Sawmill & Woodworking Association (ISWA) as the collaborating agency for forty-eight months starting October 2017 with a total approved budget of USD 787,013 comprising contributions of ITTO and GOI.

## Evaluation scope, focus and approach

3. The evaluation commenced with a review of the project design, logical framework matrix, achievement of measurable indicators, and intended outcomes based on the project document, progress reports, technical reports, the completion report and other associated documents provided by ITTO and Project Management Unit. A site visit and meetings with relevant stakeholders were conducted to assess the impact and present conditions after project completion.

## Project facts

4. Indonesia faces a shortage of electricity supply, particularly in rural and remote regions, and heavily relies on coal and fossil fuel generated power plants. The government aims to increase the supply of electricity from renewable sources to 15% by 2025. The forest sector is expected to contribute by supplying biomass for energy utilization, but it faces challenges such as undeveloped sources, unsustainable supply of energy wood, lack of manpower, and investment. The ISWA and the Ministry of Environment and Forestry initiated this project in North Sumatra to improve efficiency in utilizing forest resources for wood-based bio-energy, following a regional forum's recommendation.

5. The Development Objective of the project was to increase contribution of the forest sector to renewable energy supply and regional economic development through increased supply of wood-based biomass energy. The Specific objective of this project was to improve enabling conditions for building up capacity to supply wood-based biomass energy in North Sumatera region. Three strategic outputs were identified and supported by 16 planned activities.

6. This project commenced on 1 October 2017 and was completed as planned on 30 September 2021. Project Duration was 48 months with a total budget of USD 787,013: USD 589,853 from ITTO and USD 197,150 from GOI.

## Findings and lessons learned

7. A stakeholder consultative meeting was conducted during the project formulation process, involving primary stakeholders of wood-based energy. This meeting served as a platform for information sharing, gathering feedback on the main problem, and aligning interventions and implementation strategies. The State Electricity Company (PLN) was initially identified as a secondary stakeholder but later participated in a Stakeholder Consultation Forum during project implementation. Using the problem tree technique recommended by the International Tropical Timber Organization (ITTO), primary stakeholders analyzed the key problem, identifying its consequences and causes. This analysis facilitated a deeper understanding of cause and sub-cause relationships, leading to the definition of relevant solutions. The project design followed the ITTO manual on project formulation, allowing for smooth implementation with minimal adjustments to planned activities. Operational planning was made easier due to the well-structured project design.

8. The project team completed all sixteen planned activities with a few deviations approved by the PSC/ITTO. Completion of these activities yielded the respective outputs that met the measurable set indicators in the Logical Framework Matrix, LFM. These activity output had contributed to achieving the targeted three Outputs identified in the LFM. Consequently, the Specific Objective was accomplished. This could have created the favorable conditions for realizing the development objective. However, the measurable indicators of Development Objective after three year of project completion have yet to be achieved. It may be premature to measure its achievement as this evaluation was conducted seventeen months after project completion.

9. The key problem addressed by the project had a strong rationale; it was based current issues surrounding the national energy market of Indonesia which was closely linked with the too low share of renewable energy in the national energy mix and this was affirmed by the primary stakeholders: district government, local communities and local private firms. The clear cause-effect relationship had facilitated construction of a sound project design with a strong vertical logic, relevant elements and well-defined interventions. The sound project design had eased the operational planning and facilitated the smooth implementation with only minor adjustments to planned activities.

10. The MOU signed between the Directorate of Production Forest Development of the Directorate General of Sustainable Production Forest Management and ISWA clearly established the roles and responsibilities of each party, thus avoiding any confusion during the course of project implementation.

11. The small Project Management Unit, consisting of only four key personnel (Project Coordinator, Project Secretary, Project Finance Officer, and Field Supervisor), demonstrated its ability to effectively manage project operations and quickly adapt to changing project environments. Close communication and coordination between the Project coordinator and the ITTO Secretariat had significantly contributed to overcoming operational issues and expediting the pace of operation.

12. The Logical Framework Matrix (LFM) indicators of achievement were derived from the project design created during the project formulation. It is essential to refer to these indicators regularly during the course of project implementation as a means of measuring achievement and make necessary adjustments based on the actual progress made. There may be occasions where it is necessary to review the indicators.

## Conclusions and Recommendations

13. This project aimed to address the challenges faced in the national energy market of Indonesia, particularly the weak conditions for developing wood-based biomass energy supply in North Sumatra. The problem was analyzed in-depth, identifying its main causes, sub-causes, and consequences. The project design followed a clear cause-effect relationship, ensuring logical and consistent solutions. While policy reforms related to state forest use for energy forest development could have been included, they were considered separate initiatives due to resource and time constraints. The roles and responsibilities of the executing and collaborating agencies were well-defined to avoid any confusion during implementation. The project was efficiently managed by a small Project Management Unit, completing all planned activities within the approved budget and timeframe. However, no investments were made in wood energy-based electricity generation or wood pellet industry during the project.

14. When designing similar projects in the future, it is crucial for project proponents to adhere to the ITTO Manual on project formulation and ensure full participation of the primary stakeholders. This will help create a robust project design that its intended impact or outcome can be realized.

15. To encourage investment in a biomass electricity generation facility, it is essential to incorporate study on policy reforms as part of the project interventions. This should involve collaboration with relevant government agencies responsible for regulating the availability of land for Energy Forest Plantation (EFP) establishment.

16. To accelerate the growth of energy forest plantations on private or community-owned land, it is highly recommended to establish collaborations with established wood pellet manufacturers in the region instead of pursuing new investments and/or creating new markets.

17. Explore the possibility of integrating social forestry into energy forest plantations to encourage the involvement of the local community/farmer. Offering sustained supplementary income to the local community/farmer can serve as a compelling motivation for their active participation in energy forest plantation.

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# Main Text

## 1. Introduction

### 1.1 Background and rationale of the evaluation

The Committee on Economic, Statistics and Markets and the Committee on Forest Industry, during their Fifty-sixth Session in November 2022 decided that an ex-post evaluation of PD 737/14 Rev.2 (I) to be conducted in order to establish how well the Project served its purposes and to draw up recommendations for future action. The decision of the Committees was based on the Council Decision 3(XXVIII) of 30 May 2000 which specifies the criteria for selection of projects to be ex-post evaluated.

The ex-post evaluation was carried out on 3 – 6 March 2023, approximately seventeen months after project completion. This report provides an in-depth diagnosis of the project, presents its successful and unsuccessful outcomes, the reasons for successes and failures, the sustainability of its effects and contributions toward the achievement of ITTO Objective 2000, and recommendations that can improve similar projects in the future.

### 1.2 Project identification

Serial number: PD 737/14 Rev.2 (I)

Title: Developing Supply Capacity of Wood-Based Biomass Energy through Improved Enabling Conditions and Efficient Utilization of Degraded Forest Lands involving Local Communities in North Sumatra Province of Indonesia

### 1.3 Executing Agency and Collaborating Agencies

Host Government: Republic of Indonesia

Executing Agency: Directorate of Production Forest Development (UHP) of Directorate General of Sustainable Management of Production Forests (PHPL), Ministry of Environment and Forestry, Indonesia

Collaborating Agencies: Indonesian Sawmill & Woodworking Association (ISWA)

### 1.4 ITTO context of the project

ITTA 2006

The objectives of the International Tropical Timber Agreement (ITTA) 2006 are to promote the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests, and to promote the sustainable management of tropical timber producing forests.



PD 737/14 Rev.2 (I) is aligned with the ITTA 2006 objectives, specifically by:

- (c) contributing to sustainable development and to poverty alleviation;
- (i) promoting increased and further processing of tropical timber from sustainable sources in producer member countries, with a view to promoting their industrialization and thereby increasing their employment opportunities and export earnings;
- (j) of ITTA 2006 “encouraging members to support and develop tropical timber reforestation, as well as rehabilitation and restoration of degraded forest land, with due regard for the interests of local communities dependent on forest resources; and
- (r) encouraging members to recognize the role of forest-dependent indigenous and local communities in achieving sustainable forest management and developed strategies to enhance the capacity of these communities to sustainably manage tropical timber producing forests.

PD 737/14 Rev.2 (I) is also aligned with the following specific actions and expected outcomes under the ITTO Strategic Action Plan 2013-2018

Strategic Priority 1 “promote good governance and enabling policy frameworks for strengthening SFM and related trade and enhancing SFM financing and investment”.

- Under this project, energy forests established would be sustainably managed in order to support sustainable wood-based energy industry. In this manner, forest that is sustainably managed and legally harvested will be increasing,

Strategic Priority 2 “increase the contribution of tropical forests to national and local economies, including through international trade”.

- The project dealt with creating enabling conditions for development of energy forests on degraded lands involving local communities in order to increase contribution of the forest sector to national/local economies and improve livelihood as well as employment of local communities

Strategic Priority 4 “reduce tropical deforestation and forest degradation and enhance the provision of environmental services”.

- Development of energy forests on degraded lands will increase the capacity to address climate change adaptation and mitigation through SFM and generate income stream from energy forests. Therefore, proposed project is in conformity to.”

Strategic priority 6 “build and develop human resource capacity to implement SFM and increase trade in forest goods and services from sustainably managed forests”

- Among the project activities implemented were to train local communities on skills for energy forest development including efficient harvesting techniques and for management of business cooperative including marketing of energy wood; to strengthened capacity at community level to add value to forest resource.

## **2. Evaluation scope, focus and approach**

### **2.1 Scope and focus**

This report provides an in-depth diagnosis of the project, identifying its successful and unsuccessful outcomes, the reasons for the successes and failures, the sustainability of the project's outcomes, and contribution towards the achievement of ITTA 2006 Objectives and ITTO Strategic Action Plan 2008-2011, and to draw lessons that can be used to improve similar projects in the future.

### **2.2 Terms of reference**

- Assess the project's design and contribution to the achievement of the project objectives.
- Assess the achievement of the project's outputs and specific objectives.
- Evaluate the impact and relevance of the project, detailing its impact on development and specific objectives as stated in the project documents.
- Determine the effectiveness of technology transfer to target groups if applicable.
- Assess the overall post-project situation for the projects, including the conditions of their intended direct or indirect beneficiaries.
- Define and assess unexpected effects and impacts, either harmful or beneficial, and present the reasons for their occurrences.
- Analyze and assess implementation efficiency, including the technical, financial and managerial aspects.
- Assess the overall sustainability of the project after completion, and include appropriate recommendations to safeguard the continuity of its positive impacts, and enhance utilization of the technologies (if applicable) and other results developed by the project.
- Taking into account the results of the evaluation, make an overall assessment of the projects' relative success or failure, to summarize the key lessons learnt; and identify any issues or problems that should be taken into account in designing and implementing similar projects in future.
- Assess the overall cost of the projects with original budget provisions, and their respective linkage with the overall results.
- Prepare the evaluation report in accordance with the references for the Project Evaluation Report, as contained in the ITTO Manual for Project Monitoring, Review and Evaluation, third edition and the ITTO Manual on Standard Operating Procedures 2009.
- Assess the project's contribution to the relevant ITTA objectives (1994 and 2006) and the relevant ITTO Action Plan.
- Prepare one or more articles for each project, for possible publication in the ITTO Tropical Forest Update (TFU), in consultation with the editor, containing an overview of the projects and summarizing the lessons learned from the evaluation work. Appropriate photographs should be provided.

Annex 1 shows the timelines for this evaluation as agreed upon by ITTO and the Consultant.

## 2.3 Approach

A review of the project design, logical framework matrix, planned and reported outputs, and intended outcomes was conducted using the following reference documents provided by ITTO:

- Project Document (project proposal)
- Inception Report
- Yearly Plan of Operation
- Progress Reports
- Final Technical Reports
- Completion Report
- Final independent financial audit report

EA representatives and Ministry of Environment and Forestry staff were briefed on the purpose and methodology of the ex-post evaluation during the opening meeting held in Jakarta on 3 March 2023.

For 4-6 March 2023, interviews were conducted with field staff, participating local communities, and local institutions.

Annex 2 outlines the Consultant's itinerary of travel to Indonesia.

### **3. Project facts**

#### **3.1 Background and origin**

Indonesia is experiencing shortage of electricity supply. As a result, many regions: rural areas, remote regions, isolated small islands including North Sumatra have not been able to develop their economies as planned. The electricity supply is relying heavily on coal and fossil fuel generated power plants and the price of electricity has to be heavily subsidized by the government. One of the national policy objectives is to increase the supply of electricity from renewable sources from the present 7% only to 15% in 2025 by building up green power plants totalling 810 MW across the country. Towards this, the forest sector is expected to contribute by sustainable supply of biomass for energy utilisation from available forest. However, the key problem facing the forest sector is that enabling conditions for building up supply capacity of biomass energy are evidently weak due to undeveloped source, unsustainable supply of energy wood, lack of competent manpower and lack of investment. Thus, the need to address these problems if the forest sector is going to play its role in the supply of renewable energy.

The origin of this project was the initiative of ISWA and the Ministry of Forestry in their efforts to raise the contribution of forest sector to economic development through improved efficiency in utilising forest resources; it was also a concrete follow-up action to the recommendation of the ITTO-sponsored "Asia Pacific Regional Forum on promoting wood-based bio-energy using wood residues and wastes in tropical countries" held in Jakarta, Indonesia in October 2008. North Sumatra was chosen as the site for the project considering the shortage of electricity supply that persists and the absence of commercial wood-based energy industry in the region. This project was designed for a 4-year duration to allow for observation of activities in one full rotation starting from planting until harvesting.

#### **3.2 Development objective**

The project aimed to increase contribution of the forest sector to renewable energy supply and regional economic development through increased supply of wood-based biomass energy.

#### **3.3 Problem addressed**

To improve the enabling conditions for building up supply capacity of wood-based biomass energy are evidently weak due to undeveloped source, unsustainable supply of energy wood, lack of competent manpower and lack of investment in the forest sector in North Sumatra region.

#### **3.4 Specific objectives and outputs**

The project aimed to improve enabling conditions for building up supply capacity of wood-based biomass energy in North Sumatra region through,

- development of sustainable supply of energy wood initiated;
- skillful manpower for development of wood-based biomass energy available; and
- investment in wood-based energy industry development promoted.

### **3.5 Start date and project duration**

This project commenced on 1 October 2017 and was completed as planned on 30 September 2021.

Project Duration: 48 months

### **3.6 Budget**

ITTO :	USD 589,863
Government of Indonesia/ISWA (in-kind) :	USD 197,150
TOTAL :	USD 787,013

Out of the total ITTO contribution, a sum of USD 103,252 was retained for project monitoring and review, ex-post evaluation, and programme support costs.

## **4. Findings and lessons learned**

### **4.1 Findings**

#### **4.1.1 Project design and contribution to achievements**

During the project formulation process, a stakeholder consultative meeting was held among primary stakeholders of wood-based energy. This meeting provided a platform for sharing information and experiences on wood-based energy development, gathering feedbacks on the main problem to be addressed, and harmonizing necessary interventions and implementation strategies. While the State Electricity Company (PLN) was identified as a secondary stakeholder and was not involved in the project formulation. However, they subsequently participated in a Stakeholder Consultation Forum alongside other secondary and tertiary stakeholders during the project implementation.

The primary stakeholders analysed the key problem using the problem tree technique advocated by the International Tropical Timber Organization (ITTO). This comprehensive analysis mapped out the consequences, direct and indirect causes of the issue, which facilitated a deeper understanding of the cause-and-effect relationships. This understanding enabled the definition of relevant and effective solutions to the problems. The problem tree illustrated the cause-and-effect relationship, while the solution tree was used to identify the means-end or project interventions. The project design was defined in accordance with the ITTO manual on project formulation. The sound project design had eased the operational planning and facilitated the smooth implementation with only minor adjustments to planned activities.

#### **4.1.2 Achievement of the outputs and objectives**

##### **a. The Outputs**

Achievement of defined outputs was assessed using the indicators defined in the logical framework matrix presented in the project document or its revision thereof as follows:

Output 1.1: Available suitable lands for energy forest development identified and mapped

This output had been achieved: available suitable lands for energy forest development had been identified and mapped

Output 1.2: Suitable lands for development of energy forest models in 3 FMUs identified and mapped

This output had been achieved: available suitable lands for energy forest plantations had been identified and mapped in 3 FMUs.

Output 1.3: 36 Ha of energy forests established using 3 species at 3 sites

This output had been achieved: 33 ha of energy forest model had been established; 3 ha short of the target.

Output 1.4: Estimates of sustainable energy wood supply planted on degraded lands available

This output had been achieved: as estimates of sustainable supply of energy wood planted on degraded lands were produced.

Output 1.5: Potential supply of energy wood from non-forest sources assessed

This output had been achieved: as figures on potential supply of energy wood from non-forest sources had been generated.

Output 2.1: Dialogue with local communities of 50 villages in 13 districts conducted (number of districts reduced from 25 to only 13 for technical reasons approved by the PSC)

This output had been achieved: Dialogues had been conducted at 49 villages, one short off the target

Output 2.2: 100 farmer leaders trained on EFD techniques

This output had been achieved: 205 farmer leaders were trained on EFP development techniques

Output 2.3: 50 farmer leaders trained on community cooperative management

This output had been achieved: Only 70% of the target was met mainly due to the enforcement of health protocols on covid19 pandemic control

Output 2.4: comparative studies on wood-based energy development conducted

This output had been achieved: 3 comparative studies with 6 participants

Output 2.5: Three (3) technical manuals on EFD using gamal (*Gliricidia sepium*), kaliandra (*Calliandra callothyrsus*) and lamtoro (*Leucanea leucocephala*) formulated

This output had been achieved: Three technical manuals on EFD using gamal, kaliandra and lamtoro species formulated

Output 3.1: Website of wood-based energy operational

This output had been achieved: project website had been in operation since Year 1

Output 3.2: One national workshop on wood-based energy development organized in Pematangsiantar City in Year 1 (the venue was moved from Medan for cost efficiency reason)

This output had been achieved: workshop had been organized

Output 3.3: Data on calorific properties of gamal, kaliandra and lamtoro planted at 3 FMUs

This output had been achieved: calorific properties of gamal and kalindra age at 30 and 36 months grown at two different sites were finally generated

Output 3.4: Feasibility study on investment in wood pellet industry conducted

This output had been achieved: feasibility study was completed

Output 3.5: Existing policy on wood-based energy development reviewed

This output had been achieved: as existing policy on wood-based energy development was reviewed involving stakeholders

Output 3.6: A stakeholder consultation forum operational

This output had been achieved: The sixth indicator was met as the stakeholder forum on wood-based energy development was established

b. Specific objectives

Specific objective: To improve enabling conditions for building up capacity to supply wood-based biomass energy in North Sumatera region

By definition, delivery of the outputs pertinent to the specific objective means that that specific objective has been achieved. The achievement is also verifiable using the indicators defined in the logical framework matrix as illustrated below:

Indicator 1: Approximately 36 Ha of energy forest established and used for demonstration and training

Achievement at the end of project: 33 ha of energy forest model had been established and used for demonstration and training

Indicator 2: At least 100 farmers leaders trained on skills for energy forest development and 50 leaders on community cooperative management

Achievement at the end of project: The project had trained 205 farmer leaders on development of Energy Forest Plantation and another 35 leaders on community management. The reduced number was due to the Covid 19 restriction on the number of people allowed in a congregation during training.

Indicator 3: 2-3 companies indicated interest in making investment on wood-based energy industry

Achievement at the end of project: Reported that two entrepreneurs expressed interests to invest in wood pelleting manufacturing, however, the long Covid 19 condition may had affected their plans.

c. Development objective

Given that the specific objective has been accomplished, they would have created favourable conditions for realizing the development objective: To increase contribution of the forest sector to renewable energy supply and regional economic development through increased supply of wood-based biomass energy.

However, the progress of Energy Forest Plantation (EFP) development is dependent on various factors, including government policies, investments, and participation of local communities. While the project has created trained manpower and technical information on EFP establishment, a clear government policy on the accessibility of land for EFP and investment in the utilization and processing of biomass are still lacking. To fully realize the development objective of the project, there is a need to align EFP development with investment in biomass utilization and processing.

#### 4.1.3 Impact and relevance of the project

Below are the highlights the impact and relevance of the project based on the information gathered during the visits to selected project beneficiaries:



#### Visit to Demonstration plot at Simalungun District

Met with Mr. Rio Sitanggung, Representative of Provincial Environment and Forestry Agency of North Sumatra, Permatangsiantar who was a technical field staff during the project implementation.

Three sites were selected to establish the forest energy models (demonstration plots): Simalungun, Humbang Hasundutan and Tapanuli Selatan. At each site, three species (gamal, kaliandra and lamtoro) suitable for wood energy were planted. In Simalungun, 3 ha per species were planted, but lamtoro failed 18 months after planting. However, this species survives in the other two sites.

The planting site in Simalungun is at the fringe of oil palm plantation and there are oil palms growing in between the planted trees. The age of the oil palm plantation is about similar with the age of energy forest plantation. This site is used for training the farmers on establishment of energy forest plantation and studies were also conducted on the biomass and energy content of the planted species. At the time of visit, it was noted that the planted trees were previously harvested twice for experimental study on calorific value and the remaining trees are second or third regeneration from the coppices.

During the discussion at site, it was opined that the main issue now was the lack of market opportunity of the wooden pellets as one of the initial objectives of the project resulting in the impact of Covid-19 pandemic that limited the study of potential market of wood unfavourable economic returns for farmers participating in this project. It was also pointed out that the Covid-19 pandemic had somehow hampered the progress of market development for the targeted energy pellet production.

Also noted are some issues with forest land. This energy forest model cum demonstration plot is also used for social forestry purposes where the local communities will manage the land. Several initiatives like the planting of durian and bee keeping for honey were incorporated for the communities. There are evidences of active beehives under the kaliandra stands during the visit. This is the unintended impact of this project. In terms of project sustainability, it was noted that this demonstration plot will be used for research and development by Simalungun University.

#### Visit to Provincial Environment and Forestry Agency of North Sumatra

Met with Mr. Muhammad Ridwan and Mr. Dyben Naptupulu. The Provincial Agency is undergoing some changes and staff reshuffling at the time of visit. However, the office is supportive of the project and will identify any possible initiative to proceed forward. They are prepared to facilitate on issues related to their portfolio and function. However, the present team has not received any request with regards to establishment of energy forest plantation.

#### Visit to Sustainable Forest Management Office Unit II Medan

Met the head officer, Mr. Kusnadi. Through the discussion, it was opined that the energy forest plantation for electricity generation may not be feasible, but may be feasible for wood pellets or wood chips. As for now, it is noted that there are three private factories producing energy pellets in this province using sawdust from existing timber processing companies.

Mr. Kusnadi prompted the importance of economic return for the local communities to develop energy forest plantation compare to other government initiatives such as the planting of Macedonian, bamboo and acacia for pulping. A deep understanding on the various options is

needed to provide confidence for the involvement of local communities.

The outputs of this project do not seem to encourage the expected investment among the private investors and electricity company to use biomass that will in turn promote the establishment of energy forest plantation.

#### **4.1.4 Effectiveness of technology transfer**

Technology transfer has been performed through different means as follows:

- i) Conducted dialogues with local communities on benefits of energy forest plantation (EFP) at 49 villages participated by 527 villagers.
- ii) Conducted training program on EFP development techniques attended by 205 persons
- iii) Trained 35 community leaders on skills for managing village cooperative
- iv) Issued Three (3) technical manuals for EFP development using gamal, kaliandra and lamtoro for producing chip wood, wood pellet or electricity through direct or indirect conversion
- v) A webpage was established to disseminate information on technology and market for wood-based energy
- vi) A workshop was organized in collaboration with the North Sumatera Provincial Forestry Agency (NSPFA) to disseminate the outputs from this project. Some fifty people representing different stakeholders in North Sumatera province (government sector, forest companies, local communities, universities, forestry R&D, practitioners, NGOs, etc.) were attended this workshop.

#### **4.1.5 Overall post-project situation**

The prevailing situation after project completion can be summarized as follows:

- i) Raised awareness of target local communities

The targeted local communities or farmers are now better aware of the potential benefits of energy forest development. Some of them were trained in the various aspect of EFP establishment and also skills on managing village cooperative

- ii) Strengthening policies and programmes on energy forest plantation development

Through the participation of NSPFA in the project, they are now aware of the potential benefits of EFP development, and recognized the weaknesses of existing policy on wood-based energy development, and at the same time acknowledged the great potential contribution of the forest sector to the share of renewable energy in national energy mix. However, for the issue of “clear and clean” status of state production forest lands for EFP development, it requires strong commitment of the government to enhance existing policy to accelerate the development for the benefits of stakeholders and while also adhering to sustainable forest management principles.

- iii) Physical environment

With regards to physical environment, the project had established a total of 33 hectares of energy forest models at Three (3) sites (demonstration plots of gamal, kaliandra and lamtoro species), i.e. 9 Ha, 12 Ha and 12 Ha at Simalungun FMU, Humbang

Hasundutan FMU and Tapanuli Selatan FMU, respectively. These sites were experimental in nature during the project duration to obtain the necessary technical data and also served as the demonstration and training sites for the local farmers on various aspect in the establishment of EFP. These plots are still existing and may continue to serve these purposes when the needs arise. Under the project, 205 community leaders had been trained on different skills relating to wood-based energy development and also on production of bee honey and management of village cooperatives.

#### **4.1.6 Unexpected effects and impacts**

The unexpected effects and impacts of the project are presented below:

- The interest expresses by Simalungun University to use demonstration plots set up by this project for research and development activities of their students. However, this will need further discussion with the NSPFA for the access and use of the site for educational purposes.
- During the project implementation, the villagers expressed a need for guidance on honey bee rearing, which was subsequently approved by ITTO and carried out using balance project funds. The suitability of Kaliandra trees for honey bee production was demonstrated at the Simalungun energy forest plot, and this activity has been ongoing ever since. It is important to take this into account in future EFP development.

#### **4.1.7 Effectiveness of the project implementation**

ISWA was fully responsible for implementing the project, as mandated by the Directorate of Production Forest Development of the Directorate General of Sustainable Production Forest Management through a MOU that clearly outlined the roles and responsibilities of each party. The small Project Management Unit (PMU) under ISWA proved to be highly effective in managing project operations. The project's key success factors were attributed to the strong leadership of the Project Coordinator and his excellent working relationships with both internal and external partners. Close communication and coordination between the PMU and the ITTO Secretariat facilitated the resolution of various operational issues and expedited project implementation. The PMU's high adherence to rules and procedures enabled the timely and budget-compliant completion of the project. The project strategy was implemented collaboratively with project beneficiaries, relevant institutions, and competent partners, aligning with the specified project elements and effectively achieving project objectives. The project execution was simplified by supportive government authorities and cooperative local communities, allowing for smooth implementation of planned project activities without any issues.

During project implementation, a few minor modifications to the planned activities were unavoidable and were approved by ITTO. However, the change of Activity 1.2 from "Formally allocating lands for energy forest development on existing land use plans" to "Identifying suitable lands for forest plantations in 3 FMUs" was discussed and approved at the PSC meeting and could be considered a major change. The original activity was deemed difficult, if not impossible, to accomplish within the project duration. Changing the existing land use plan of the province would require significant resources, especially time and effort, due to complicated bureaucratic processes. However, it is noted the outcome of this activity could potentially instil confidence in investing in the utilization of wood energy resources for electricity generation or wood pellets.

Throughout the project implementation, the executing agency submitted an Inception Report and four Yearly Plan of Operations (YPOs) to ITTO, which were endorsed as guiding

documents for project operations. In addition, nine bi-annual progress reports were timely submitted to ITTO, and five PSC meetings were organized. To ensure financial accountability, three yearly financial audit reports and one final audited report were produced with the assistance of an independent, certified public accountant, which were duly endorsed by ITTO. The executing agency also submitted a completion report to ITTO and delivered three technical reports.

#### **4.1.8 Overall sustainability**

The overall sustainability of the project is highly dependent on the planned investment in a biomass-based electricity generating plant by PLN. However, the establishment of an EFP for electricity, which requires a significantly large land area, is contingent on relevant government agencies addressing land availability issues through policy reforms. Without such supports, the establishment of a biomass-based electricity generation plant may not be feasible.

It is critical to create a demand for energy wood planted by local communities on degraded lands. Investment in energy wood processing can facilitate this demand. To promote the development of wood-biomass energy and ensure the project's sustainability, securing a market for wood pellets is crucial. This will incentivize local stakeholders to participate in and sustain the project.

#### **4.1.9 Overall success/failure of the project**

Overall, the project can be considered a success, with minimal shortcomings in delivering sixteen planned activity outputs defined in the Logical Framework Matrix and fully achieving its specific objective. The Development Objective indicators were set to be achieved three years after project completion, and although this assessment was conducted only seventeen months after completion, it is possible that the project's full impact has not been realized yet. However, if land issues affecting the energy forest plantation are not addressed through policy reforms, the expected project impact may not be achievable.

#### **4.1.10 The overall cost of the project**

The total amount of project approved budget was US \$ 787,013 comprising contributions of ITTO and GOI in the amounts of US\$ 589,863 and US\$ 197,159, respectively. Out of the total ITTO contribution, USD 103,252 was retained for project monitoring and review, ex-post evaluation, and programme support costs.

## **4.2 Lessons learned**

### **Project Identification and Design**

- The key problem addressed by the project had a strong rationale; it was based current issues surrounding the national energy market of Indonesia which was closely linked with the too low share of renewable energy in the national energy mix and this was affirmed by the primary stakeholders: district government, local communities and local private firms.
- However, State Electricity Company (PLN) should had been identified as a primary stakeholder and involved in project formulation process to ensure an impactful outcome for the project

- The key problem identified was thoroughly analysed involving representatives of the primary stakeholders to fully understand its cause-effect relationship by identifying the consequences as well as the direct and indirect causes of the key problem;
- The clear cause-effect relationship had facilitated construction of a sound project design with a strong vertical logic, relevant elements and well-defined interventions;
- The sound project design had eased the operational planning and facilitated the smooth implementation with only minor adjustments to planned activities; and
- To minimize the time lapse between conceptual achievement and factual or real achievement, project proponents should distinguish between them when defining SMART indicators of outputs for objectives. This means that they should clearly specify which indicators are measuring the actual output achieved and which ones are measuring progress towards achieving the desired outcomes. By doing so, project proponents can track progress better and identify areas where adjustments may be needed, and ultimately achieve the desired outcomes more efficiently.

#### Lesson learned on Project Implementation:

- The Directorate of Production Forest Development of the Directorate General of Sustainable Production Forest Management was the executing agency of the project, which mandated ISWA to fully implement the project based on a Memorandum of Understanding (MOU) signed by both parties. The MOU clearly established the roles and responsibilities of each party, thus avoiding any confusion during the course of project implementation.
- The small PMU, consisting of only four key personnel (Project Coordinator, Project Secretary, Project Finance Officer, and Field Supervisor), demonstrated its ability to effectively manage project operations and quickly adapt to changing project environments.
- A crucial factor for the success of a project is primarily the strong leadership of the Project Coordinator and their ability to maintain positive working relationships with internal and external partners, including the executing agency, collaborating agency, and ITTO Secretariat.
- Close communication and coordination between the Project coordinator and the ITTO Secretariat had significantly contributed to overcoming operational issues and expediting the pace of operation;
- The PMU's high level of compliance with the rules and procedures applicable to ITTO projects, as well as with the project agreement, facilitated the completion of the project within the allotted time and budget.
- The strategy adopted for implementing the project was in line with the specified project elements and was operationalized through close collaboration with project beneficiaries, relevant institutions, and competent partners. This collaborative approach proved to be effective in achieving the project objectives;

- The supportive government agencies, private companies and cooperative local communities simplified and facilitated the full execution of planned project activities; and
- The Logical Framework Matrix (LFM) indicators of achievement were derived from the project design created during the project formulation. It is essential to refer to these indicators regularly during the course of project implementation as a means of measuring achievement and make necessary adjustments based on the actual progress made. There may be occasion where it is necessary to review the indicators.

## **5. Conclusions and Recommendations**

### **5.1 Conclusions**

The main issue addressed in this project was the challenges faced in the national energy market of Indonesia, specifically the weak enabling conditions for building up the supply capacity of wood-based biomass energy in the North Sumatera region. The problem was thoroughly analyzed, identifying its main and sub-causes, as well as the consequences. The project design was based on a clear cause-effect relationship, with a strong vertical logic and consistency with the problems to be addressed. It was noted that the formulation of the project could have also included related policy reforms on the use of state forest for energy forest development which could synergize with the output of this project to provide the necessary impact. However, policy changes could entail significant resources and time, and may be treated as a separate concurrent initiative.

The roles and responsibilities of the Executing Agency, Directorate of Production Forest Development and ISWA as the collaborating agency and implementing unit were clearly defined in the MOU, thus avoiding any confusion during the project implementation.

The project operations were managed by a small Project Management Unit (PMU) comprising a coordinator, secretary, technician, field supervisor, and management advisor, which proved to be efficient in completing the project within the approved budget and project duration. Although the specific objective was nearly achieved through the execution of sixteen planned activities related to three outputs, it should be noted that no investment was realized in the wood energy-based electricity generation and wood pellet industry during the project duration.

### **5.2 Recommendations**

#### **a. For the Executing Agency**

1. When designing similar projects in the future, it is crucial for project proponents to adhere to the ITTO Manual on project formulation and ensure full participation of the primary stakeholders. This will help create a robust project design that its intended impact or outcome can be realized.
2. To encourage investment in a biomass electricity generation facility, it is essential to incorporate study on policy reforms as part of the project interventions. This should involve collaboration with relevant government agencies responsible for regulating the availability of land for Energy Forest Plantation (EFP) establishment.
3. To accelerate the growth of energy forest plantations on private or community-owned land, it is highly recommended to establish collaborations with established wood pellet manufacturers in the region instead of pursuing new investments and/or creating new markets.
4. Explore the possibility of integrating social forestry into energy forest plantations to encourage the involvement of the local community/farmer. Offering sustained supplementary income to the local community/farmer can serve as a compelling motivation for their active participation in energy forest plantation.

b. For ITTO

To ensure the impact as well as effectiveness of project interventions, adherence by any proponent to existing manual on project formulation is to be fully observed by the Expert Panel in assessing any project proposal.



## **Annex 1 ITTO - Consultant agreed timelines**

### Proposed Work Schedule (2023)

Jan	Dispatch of the following documents supporting for the evaluation work: (i) ITTO Manual for Project Monitoring, Review and Evaluation (ii) Project documents (iii) Technical reports (iv) Project financial statements (audit report) and (v) Project completion reports
Feb/March	Trip to Indonesia. Meeting with the national authority (Ministry of Environment and Forestry), projects' executing agencies/collaborating agencies and former personnel of the project management units for briefing and comprehensive discussions on and analysis of projects implementation and results, as well as outlining the agenda for field visits. Discussions with relevant stakeholders involved in the projects works in Indonesia (the exact dates for visiting Indonesia will be determined in consultation with the Ministry of Environment and Forestry/Executing Agencies).
June	Submission of draft report and its executive summary to ITTO and the Ministry of Environment and Forestry/Executing Agencies
August	Submission of the final report, including an executive summary, and the article for TFU to ITTO.
November	Presentation of the report at the 59th Session of the ITTO

## Annex 2 Schedule of ex-post evaluation meeting and field visit in Indonesia

Date	Place/Site	Organization	Remarks
3 March 2023, Friday	Jakarta	Biro KLN, MoEF	P.M.: Entry meeting with Project Representatives: EAs, CA and main stakeholders presided by Dr. Dodi Simandi, Deputy Director for International Cooperation Facilitation, International Cooperation Bureau.
4 March 2023, Saturday	Jakarta/Medan		Transiting
5 March 2023, Sunday	Medan	Biomass planting site – Pematangsiantar	Met with Mr. Rio Sitanggang, Project technical field officer and local community involved in the project.
6 March 2023, Monday	Medan	Provincial Environment and Forestry Agency of North Sumatra  Sustainable Forest Management Office Unit II Medan	Met with Mr. Muhammad Ridwan and Mr. Dyben Naptupulu.  Met with Head Officer, Mr. Kusnadi.
7 March 2023, Tuesday	Medan/Jakarta/ Kupang/Bajawa		Transiting

### Annex 3. Executing Agency's Views

Executing Agency's Views on ITTO Ex-Post Evaluation	
<p>Project Title: Developing Supply Capacity of Wood-Based Biomass Energy through Improved Enabling Conditions and Efficient Utilization of Degraded Forest Lands involving Local Communities in North Sumatra Province of Indonesia</p> <p>Project ID: PD 737/14 Rev.2 (I)</p>	
Overall View on the Evaluation:	
The evaluation has analyzed the comprehensive aspects in developing Supply Capacity of Wood-Based Biomass in the area as well as provided inputs for future projects.	
Evaluation Report Recommendations*	Response to recommendations (e.g. 'accept', 'partially accept' or 'reject' — please provide a brief explanation)
<p><b>Recommendation 1</b> When designing similar projects in the future, it is crucial for project proponents to adhere to the ITTO Manual on project formulation and ensure full participation of the primary stakeholders. This will help create a robust project design that its intended impact or outcome can be realised.</p>	<p><b>Accept</b> This project can be implemented in different region in Indonesia to accommodate the products of EFP developed by concession holders.</p>
<p><b>Recommendation 2</b> To encourage investment in a biomass electricity generation facility, it is essential to incorporate study on policy reforms as part of the project interventions. This should involve collaboration with relevant government agencies responsible for regulating the availability of land for Energy Forest Plantation (EFP) establishment</p>	<p><b>Accept</b> The collaboration among related ministries as policy maker, State-Owned Company (PT PLN) as electricity generation company, local community as the supplier of the biomass (wood, oil-palm) as well as university for R&amp;D is highly required to support development of wood-based biomass to support the implementation of renewable energy generation.</p>
<p><b>Recommendation 3</b> To accelerate the growth of energy forest plantations on private or community-owned land, it is highly recommended to establish collaboration with established wood pellet manufacturers in the region instead of pursuing new investments and/or creating new markets.</p>	<p><b>Partially accept</b> It is necessary to developed research regarding the economic analysis of comparation between chips and pellets as the basic justification to develop the manufacture of renewable energy generation.</p>

<p>Recommendation 4</p> <p>Explore the possibility of integrating social forestry into energy forest plantations to encourage the involvement of the local community/farmer. Offering sustained supplementary income to the local community/farmer can serve as a compelling motivation for their active participation in energy forest plantation.</p>	<p>Accept</p> <p>The collaboration among related stakeholders including local community as the wood farmer is highly required to support development of wood-based biomass to support the implementation of renewable energy generation.</p>
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Name, Title and Institution of Respondent

Dr Rina Kristanti  
Directorate General of Sustainable Forest Management  
Date: July 5, 2023



Signature