Final Evaluation Report

Your Details	
Full Name	Wiwin Iswandi Djola
Project Title	Locally managed waste facility using biodrying method in Labuhan Bajo Village, Sumbawa District, Indonesia
Application ID	36430-2
Date of this Report	30 August 2023

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Develop waste management facility using biodrying method.				The facility is partially achieved because: • Some machineries need adjustment (modification) before the local people can operate to reduce operational cost. • The location (the secretariat of the Kabete Bajo Group) is undergoing refinement.
Raise the capacity of the local community to undertake marine water quality monitoring.				Monitoring parameters related to ocean health were introduced. Some important parameters could easily be monitored using hand-held instrument such as temperature, salinity, TDS, TSS, dissolved oxygen, biological oxygen demand, and pH.
Establish a community-led marine water quality monitoring system in collaboration with university (the University of Mataram).				The monitoring parameters and mechanism at the local/village level has been agreed. The strategy is to integrate this into the ongoing project in the area on Early Warning System for coral reef health.

2. Describe the three most important outcomes of your project.

a). Waste to energy products were piloted and laboratory tested.
Waste briquettes and waste pellets were piloted and tested. The laboratory test results show that the products meet the Indonesia National Standard for co-firing (energy mix) in electricity plants. Waste briquette calorific values are higher than waste pellets. Briquettes require carbonisation process, while pellets do not. The type of plastics for briquettes and pellets are Low Density Polyethylene Plastic (LDPE) which is not recyclable and comprises the majority of plastic waste in the village.

Five products of waste briquettes and pellets piloted in this project were: (i) briquettes and pellets from pure plastics waste, (ii) briquettes and pellets from combination of plastics and coconut shells, (iii) briquettes and pellets from combination of plastics and corn cobs, (iv) briquettes and pellets from coconut shell only, and (v) briquettes and pellets from corn cobs only.

b). This project has allowed us to understand the challenges and opportunities of waste to energy initiatives at the village level particularly waste briquettes and waste pellets.

Opportunities:

- Briquettes and pellets from plastic waste can only be used in electricity plants because the local people cannot use it for cooking as more studies need to be done so as not to harm the people. However, the local community can use briquettes and pellets from biomass waste such as coconut shell, rice husks, and corn cobs for cooking using the biomass stove.
- The capacity of the coal-based electricity plant in Lombok is 75 MW. Substitution of coal with waste to energy (including biomass and reduce-derived fuel - RDF) is planned to gradually increase from 5 % to 30%. The need for biomass and RDF to substitute coal is high (Figure 1).

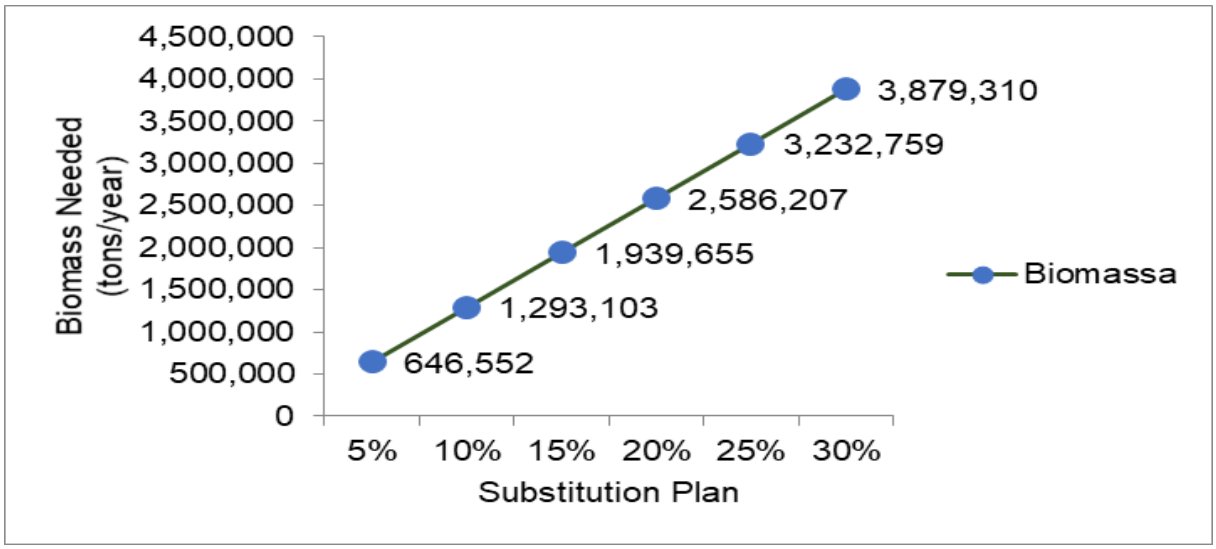

Figure 1. Substitution Plan.

- Corn harvests are massive in West Nusa Tenggara Province during, more than 900,000 tons per year. This can be a reliable source of waste from biomass for waste to energy. For energy mix in electricity plants, plastic waste can be combined with biomass.

Challenges:

- Price of waste briquettes/pellets in Indonesia is around IDR. 626.229 per ton. This is considered low compared to other countries.
- It is difficult for the village to cover the capital expenditure (CAPEX) and operational expenditure (OPEX) using the currently available machinery in the market. Some modifications are needed.

c). Marine water quality monitoring system was discussed, and most important parameters were agreed by the local people.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

The chopping machine which was available at the village required high electricity power. We resorted to manual chopping. But it took significantly longer time to get the required size suitable for briquettes and pellets. If the waste to energy facility is to be fully operating in the village, some equipment would need to be provided and modified.

4. Describe the involvement of local communities and how they have benefitted from the project.

Around 14 of local people from Labuhan Bajo Village participated in the training on how to make waste briquettes and waste pellets. Biomass stoves were introduced to them as an alternative way of cooking using waste briquettes and pellets (no plastic, just biomass). Cooking using briquettes is cheaper compared to LPG.

Comparison of bio briquettes and Liquefied petroleum gas (LPG) needs for cooking.

LPG price	**IDR 300,000/15 kg or IDR 20,000/kg**
Biobriquettes price	**IDR 2,000/kg**
Cooking using 1 kg of LPG = 3 kg of Briquettes (tested using coconut shell briquettes)	
Cooking using 15 kg of LPG = 45 kg of briquettes	
1 kg LPG	IDR 20,000
3 kg biobriquettes	IDR 6,000
Difference per kg LPG	**IDR 14,000**
Difference per 15 kg LPG	**IDR 210.000**

5. Are there any plans to continue this work?

Yes.

Plastic waste. The laboratory results have showed that the waste to energy products meet the Indonesian Standard for co-firing. Our business model analysis indicates that in order to be able to sell the products to the electricity plants, a district-wide feasibility study needs to be conducted.

Biomass waste. The laboratory results showed that the biomass briquettes and pellets calorific values meet the Indonesian Standard for co-firing. These products can also be used for cooking. There is a potential market for these products as alternative fuel sources for cooking.

6. How do you plan to share the results of your work with others?

We plan to write journal article(s) to be published in English. Hence, a lot of the quantitative data are not presented in this report such as the laboratory results, the

modification made on some equipment, the business model analysis and the Break Even Point analysis.

7. Looking ahead, what do you feel are the important next steps?

- Laboratory tests on the emission level of the waste to energy products.
- Provision and modification of equipment and machineries.
- Conduct province-wide or at least district-wide feasibility study on plastic and biomass waste to energy including market aspect.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes, we used the Rufford Foundation logo in our outreach material (t-shirts).

9. Provide a full list of all the members of your team and their role in the project.

Maulita Syahdina holds a bachelor's degree from the Marine Science Department of the University of Mataram, Indonesia. She contributed to the design of the marine water quality monitoring.

Yedi Suryadi is from the project site. He holds a bachelor's degree in communications from the University of Technology Sumbawa, Indonesia. He is responsible to communicate waste to energy initiatives in the village.

Fachry Abdul Razak Afifi holds a bachelor's degree in economics from the University of Indonesia. He contributed to the development of the business model and calculation of break-even point.

10. Any other comments?

We would like to thank:

- The Rufford Foundation for the financial support in this project.
- The people of Labuhan Bajo Village and Kabete Bajo Group.
- The University of Mataram for the monitoring mechanism support.
- Muhammad Sadir for the insight into the next steps needed.
- Dhimas Mardiyanto Prasetyo for the machinery's modification ideas.


KABETE BAJO


SUSUNAN ORGANISASI DAN TATA KERJA
PEMERINTAH DESA LABUHAN BAJO
KECAMATAN UTAN KABUPATEN SUMBAWA
KEPALA DESA
RAMLI AHMAD
SEKRETARIS DESA
MUHAMMAD AKBAR
KASI. PEMERINTAHAN
SIMBARAT
KASI. KESEJAHTERAAN
ABD. GAFUR
KASI. PELAYANAN
HENI SASMITA
KAUR. UMUM & TU
AHMAD
KAUR. KEUANGAN
HERMANTO
KAUR. PERENCANAAN
SOPIAN
RUANG KADES
BADAN PERMUSYAWARATAN DESA
prime