

Indonesia Domestic Biogas Program

2020 ANNUAL REPORT

A renewable energy for a better life



Indonesia Domestic Biogas Program

Annual Report 2020

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Abbreviations

APBD	<i>Anggaran Penerimaan dan Belanja Daerah</i> (Regional Budget)
APBN	Anggaran Penerimaan dan Belanja Negara (State Budget)
ASS	After Sales Service
Bappeda	Badan Perencanaan Pembangunan Daerah (Regional Development Planning Agency)
Bappenas	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency)
BIRU	<i>Biogas Rumah</i> (Domestic Biogas)
BSNI	Badan Standarisasi Nasional Indonesia (National Standardization Agency of Indonesia)
BSC	Biogas Service Center
BSF	Bio-slurry Support Facility
CPO	Construction Partner Organization
CSR	Corporate Social Responsibility
CSV	Corporate Share Value
CUCO	Credit Union Counselling Office
DAK	Dana Alokasi Khusus (Special Allocation Fund)
DGNREEC	Directorate General of New, Renewable Energy and Energy Conservation
DME	Dimethyl Ether
EnDev	Energizing Development
EUR	Euro
FGD	Focus Group Discussion
GIS	Geospatial Information System
HIVOS	Humanist Institute for Cooperation with Developing Countries
IDBP	Indonesia Domestic Biogas Program
INKOPDIT	Induk Koperasi Kredit (Credit Unions)
JARGAS	Jaringan Gas (gas distribution network)
KEN	Kebijakan Energi Nasional (National Energy Policy)
KIVA	US-based non-profit organization, the world's first online lending platform connecting online lenders to entrepreneurs
КОВО	A suite of tools for field data collection for use in challenging environments
KUD	<i>Koperasi Usaha Desa</i> (Village Business Cooperative)
KUR	Kredit Usaha Rakyat (Credit for small-medium enterprise)
LPG	Liquefied Petroleum Gas

Loan Partner Organization
Lembaga Pengelolaan Dana Bergulir (Revolving Fund Management Institute)
Ministry of Energy and Mineral Resources
Micro Finance Institutions
Ministry of Agriculture
Ministry of Cooperative and Small Medium Enterprise
National Biogas Program Support Office
Non-Governmental Organization
Nusa Tenggara Barat (West Nusa Tenggara Province)
Nusa Tenggara Timur (East Nusa Tenggara Province)
Provincial Biogas Program Office
Provincial Coordinator
Poly-Ethylene
Perusahaan Listrik Negara (State Electricity Company)
Perum Jasa Tirta II (Water Supply Company of Indonesia)
Quality Control
Quality Inspector
Renewable Energy Service Company
Rabobank Foundation
Research and Development
Rencana Pembangunan Jangka Menengah Nasional (National Medium-Term Development Plan)
Rencana Umum Energi Nasional (National Energy Masterplan)
Sustainable Development Goal
Search Engine Marketing
Small Medium Enterprise
Search Engine Optimization
Standar Nasional Indonesia (Indonesian National Standard)
A Netherlands Development Organization
Standard Operating Procedure
Tanggung Jawab Sosial dan Lingkungan (The Social and Environmental Responsibility)
Training of Trainers
Usaha Dagang (Trading Business)
Voluntary Emissions Reductions
Voluntary Project Activity
Yayasan Rumah Energi (Rumah Energi Foundation)

Executive Summary

Indonesia Domestic Biogas Program (IDBP) is a multi-stakeholder's program which objective is to disseminate renewable energy through small-scale household bio-digester system also known as Biogas Rumah (BIRU) in 14 provinces. IDBP's main goal is to create market for domestic biogas in Indonesia. By the end of 2020, IDBP has constructed 25,157 units of BIRU, the capacity of which ranges from 1 m3 to 20 m3.

In 2020, operational cost of IDBP is fully supported by Energize Development (EnDev). It focuses on the provinces with the highest feedstock potential and highest performing Construction Partners. The provinces comprise of Central Java, Special Region of Yogyakarta, East Java, West Nusa Tenggara, and South Sulawesi. The target is to facilitate the construction of 4,500 units of biogas from July 2019 to December 2020 with strong emphasis on the role of Lending Partner Organization's (LPO) to provide financing for potential biogas users. In 2020, there are 40 CPOs under IDBP, 32 of the CPOs operate in the 5 provinces supported by EnDev. As an effort to create more resilient CPOs in driving the local biogas market, YRE provides capacity development to 4 (four) selected CPOs through a specific business incubation program.

In 2020, YRE noted several challenges that impacted the underachievement of biogas construction numbers as follows:

- Slow adoption of new MFIs/Financial Institutions regarding the potential business of biogas technology due to their member's purchasing power;
- b. The fixed dome biogas prices is constantly increasing caused by the annual inflation rate;
- c. CPOs dependency on Special Allocation Fund (DAK), Local Government Budget (APBD) and corporate CSRs which hindered by the reallocation of APDB to Covid-19 measures;
- d. The stagnant growth of bio-slurry business at larger scale volume that could potentially drive the bio-slurry market due to the slow adoption of large fertilizer companies (i.e. Pupuk Indonesia Holding and its subsidiaries) to be the off taker of the bioslurry as collection becomes a major challenge for these companies;
- e. The significant distance between houses and biodigester hinders the users from utilizing bio-slurry.

Program Name: Indonesia Domestic Biogas Program Reporting Period: 01 January 2020 -

31 December 2020

And here are some of the mitigations carried out by YRE to overcome these challenges:

- a. Conducted webinars pertaining biogas complemented by promotion strategy to the potential LPOs.
- b. The IDBP team and CPOs had replaced some of biogas appliances installation with more affordable ones without reducing the quality and still comply with the procedure and regulation stated in the SNI. This includes piloting new bio-digester variants made from PE and fiberglass.
- c. The IDBP team has conducted advocacy and meetings with local governments for possible policies that prioritize biogas development through their legal and financial instruments.
- d. Do more intensive campaign on bio-slurry utilization and its benefits (cost reduction on chemical fertilizers, potential business models, soil rejuvenation)
- e. Support existing CPOs that have already established a bio-slurry business to scale up by providing financing facilities for permits and lab tests for mass production and wholesale market.

In July 2020 IDBP helped by consultant did a new Market Study. This is important to update the market situation for IDBP. As a result, YRE has followed up with tangible actions as recommended in the study through the following activities:

- Piloting pre-fabricated biogas made from fiberglass and polyethylene (PE) including a portable biodigester.
- Piloting 50 remote sensors attached to each unit of bio-digesters in selected households based on a pre-determined criterion.
- c. Providing Bio-slurry Support Facility (BSF) to 2 (two) of the selected CPOs, namely: CV. Riski Abadi in South Sulawesi and KUD Sumber Makmur Ngantang in East Java.

Other recommendations from the study are:

- Reactivated biogas advisory committee
- Strengthen collaboration with central and local governments
- Innovation in biogas funding
- Incorporating biogas into draft of Renewable Energy Bill

Executive Summary /

Throughout 2020, YRE and HIVOS hosted regular cross-ministerial Focus Group Discussions led and hosted by DGNREEC. Having the DGNREEC taking the lead and coordinating with other related Ministries such as MoA, MCSME, Ministry of Finance and the newly established Environment Fund Management Agency (Badan Pengelola Dana Lingkungan Hidup/ BPDLH), there has been significant progress from policy coordination perspective. With the involvement of cross sectoral Ministries and Agencies both at national and local government levels, the IDBP tries to address the policy gaps from from upstream (i.e.: waste management, fertilizer scarcity issues) to downstream (i.e. micro finance and renewable energy policies) policy making which follows the value chain of biogas market itself. By deploying this multisector approach shows that each of the Ministries/Agencies involved in the discussions has significant interest in the IDBP framework that can contribute to its KPIs. As an example: the Ministry of Agriculture's program is to expand the use of organic fertilizer as a complementary option to the long term issue of farmers' accessibility to subsidized fertilizer.

One of the follow up actions from the series of FGD was for MEMR, with the assistance from YRE and HIVOS, to submit a concept note to BPDLH on scaling-up domestic biogas as to increase number of installed biogas post 2020 and to strengthen enabling ecosystem for domestic biogas. The concept note seeks financing support from BPDLH to IDBP cooperative partners using revolving funds or guarantee as the preferred instruments.

1. Digester Construction

1.1. Number of digesters

in year

IDPB Progress per year



1.2. Number of people gains access to clean cooking energy

119,152 people have gained access to clean energy for cooking resulting from the construction of 25,157 units of digesters. In 2020 alone, 1,633 people have gained access to clean energy for cooking from 390 units of digesters.

1.3.	Number of digesters	Province	2009 to 2019	2020	1m³	2m³	3m³	4m³	6m³	8m³	10m³	12m ³	20m³	Total
	ner size of	Lampung	560	43	0	0	2	40	0	0	1	0	0	603
		West Java + Banten	1,682	15	0	0	4	6	1	1	0	3	0	1,697
	algester	Central Java	1,523	36	4	1	0	1	24	2	0	4	0	1,559
		D.I. Yogyakarta	2,401	8	1	0	0	1	2	2	0	2	0	2,409
		East Java	8,290	87	1	1	0	2	33	24	8	18	0	8,377
		Bali	1,314	15	0	0	0	9	2	1	0	3	0	1,329
		NTB	5,154	143	9	7	1	118	6	0	0	2	0	5,297
		South Sulawesi	2,732	35	0	0	0	30	4	0	0	1	0	2,767
		NTT (Sumba)	1,120	4	0	0	0	4	0	0	0	0	0	1,124
		Central Sulawesi	21	0	0	0	0	0	0	0	0	0	0	0
		South Sumatera	0	4	0	0	0	1	0	2	0	1	0	4
		Total	24,767	390	15	9	7	212	72	32	9	34	0	25,157

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1.4. Funding sources for digesters



	0.51		C	Company	100% paid by user		
Year	100% (unit)	(unit)	nit) (unit) (un		Cash (unit)	Credit (unit)	
2009 -2019	3,597	7,779	67	995	4,308	7,076	
2020	496	147	40	192	43	28	
Total	4,093	7,926	107	792	4,351	7,104	

2. Quality Inspection and After sales service

	Year	Number of Digester built in year	Total of Digester in year	Total of Digester Quality Check	Completed ASS1	Completed ASS2	Total of After Sales Service Check
	2009	62	62	62	62	62	62
	2010	1,586	1,648	1,648	1,586	1,586	1,648
	2011	2,995	4,643	4,631	2,983	2,983	4,631
	2012	3,339	7,982	7,911	3,280	3,280	7,911
_	2013	3,269	11,251	11,128	3,217	3,217	11,128
	2014	2,973	14,224	14,006	2,878	2,878	14,006
	2015	2,383	16,607	16,191	2,185	2,185	16,191
	2016	3,543	20,150	18,840	2,649	2,649	18,840
	2017	2,296	22,446	20,428	1,844	1588	20,684
	2018	1,370	23,821	22,363	1,035	434	21,719
_	2019	946	24,767	22,775	299	97	22,018
	2020	390	25,157	23,043	44	1	22,062

2.2. **Job**

Creation

The biogas sector has considerable contribution in the absorption of labor. In 2020, a total of 390 biogas digesters have been built and there are 20 jobs created from the biogas supply chain, including construction of bio-digester and the production of biogas appliances (e.g. stove, gas pipe, and manometer production). The workers have received training from IDBP on biogas installation in accordance to IDBP standards.

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01. Introduction

The Annual 2020 Indonesia Domestic Biogas Program Report (IDBP Report), will give an overview on the domestic biogas sector development in particular on how the supply, demand and enabling indicators have been progressing.

Over the last 8 (eight) years Yayasan Rumah Energi (YRE) has been implementing Indonesia Domestic Biogas Program (IDBP), and running the National Biogas Program Support Office (NBPSO) as well as the Provincial Biogas Program Offices (PBPO) to maintain IDBP partners consistency in: (i) quality assurance of digesters when penetrating the early stage of the market; (ii) biogas promotion and (iii) after sales service.

In 2020, the operational cost of IDBP is fully supported by Energize Development (EnDev). The 18 months Endev BIRU Period program (July 2019 – December 2020) focuses on strengthening and hand-over to YRE, developing the entrepreneurial skills and capacity of biogas SMEs, preparing the market for the phase out of subsidies, and strengthening the enabling environment. It is covering a core market area of four provinces with the strongest demand and highest performing biogas SMEs (Central Java and Yogyakarta, East Java, NTB and South Sulawesi). IDBP's target is to facilitate the construction of 4,500 units of biogas from July 2019 to December 2020. And in Pandemic situation, it was adjusted to 1,000 units until March 2021.

Apart from consistent and regular demand, supply and enabling environment related activities, from July 2018 - 2019 implementation period the team organized the geo-tagging activities to record GIS data of almost 17,000 digesters in 10 (ten) provinces which includes collecting data on the functionality and performance status of these digesters. By the end of 2020, a total of 25,061 BIRU digesters have their GIS position recorded by the NBPSO.



Picture 1. Location of Domestic Biogas in IDBP GIS Database 2020

The National Energy Policy (Kebijakan Energi Nasional/KEN) sets a target of 489.8 million cubic of biogas in 2025 where as by 2020 the DGNREEC-MEMR recorded 27.89 million cubic of biogas are in operation. As the current achievement is way below the 2025 target, policy advocacy to both central and local government is a priority specifically on how domestic biogas is placed within the energy mix in competition with LPG, Dimethyl Ether (DME) and gas distribution network (jaringan gas/jargas) proven by a roadmap for transition or a spatial data and the contribution of domestic biogas to relieving the pressure to the State



Budget (APBN) from importing LPG and inefficiency in distributing subsidized LPG. According to the Biogas User Survey (BUS) conducted in 2020, the use of biogas reduces the usage of LPG in average 5,5 kg/month.

Based on the calculation of Directorate General Renewable Energy and Energy Conservation (DGREEC) of the Ministry of Energy and Mineral Resources (MEMR) of Republic of Indonesia, since 2006 until December 2020 there are 47,944 biogas units spread throughout 29 provinces across Indonesia, while BIRU database shows the total number 25,157 constructed units by the end of December 2020.

Based on the study conducted by SNV Netherlands Development Organization in the year of January 2009, IDBP indicates that the potential for domestic biogas market in Indonesia could reach 1,000,000 units of digesters coming from 15,6 million cattle which could generate 2 million m3 of biogas in comparison to the to 489,8 million m3 of biogas mandated by the National Energy Masterplan (Rencana Umum Energi Nasional/ RUEN) by 2025 as part of the 23% renewable energy target set by the KEN. This means that to achieve these targets by 2025, biogas would not only aim to replace LPG by targeting markets beyond farmers and cattle farmers but it has to scale up through a more advanced technology such as compressed bio-natural gas, variety of feedstocks and eyeing for cattle industry, etc.

In order to scale up and expand the current market, businesses would need to be involved to be able to tackle the increasing cost of concrete digesters by promoting biogas energy to the market and business can be done in a commercial basis where companies are able to charge reasonable prices through competition. In the same time, it requires a set of policy measures at the national and regional level to address marketing and financing issues in biogas uptake.

In the current situation, IDBP has not been able to reach the potential of the market due to heavily subsidized LPG. Onwards, IDBP will continue the advocacy effort to reduce dependency on subsidized LPG with the hope that the demand for bio-digester will grow.

02. **Program Objectives**

Overall objectives:

To contribute to economic prosperity, and support the development of a green economy and mitigation of climate change in Indonesia through the scale up of a national biogas sector development program, to improve waste management and emission reduction in the livestock and dairy sector.

Specific objective:

To promote the development of a market-oriented domestic biogas sector that provides access to affordable clean energy for livestock and dairy farmers through dissemination and application of biogas technologies with support to finance and enabling policy environment.



Picture 2. BIRU user in West Java Province.

03. Institutional Setting



In terms of institutional development, the significant change in the IDBP program is the gradual transfer of responsibility from Hivos to YRE to sustainably run the program. To pursue this, YRE is persistently built the discussion with the local government as well as with related stakeholders for having a written agreement i.e. Memorandum of Understanding (MoU) with provinces/ districts where IDBP is implemented. Endorsement of local governments will allow continuous discussion among stakeholders to jointly support the sector development. Furthermore, it is also important to reach out to wider audience to increase the profile of IDBP. New players in the sector ranging from SMEs to industrial level businesses, NGOs and communities are the key elements in ensuring successful sector development strategies. The strategies are to include advocacy to Ministries and local governments; investment opportunities for affordable technologies; promotion and campaigns to users in collaboration with NGOs and communities. Additionally, the role of CPOs as the main driver of biogas market expansion is the core of institutionalization of the IDBP program.

04. **Overview**

4.1 Development of Demand Side

No.	Indicator
4.1.1	Product and service diversity
4.1.2	Market penetration & systems in use
4.1.3	Willingness to pay
4.1.4	Consumer awareness & Perception

4.1.1 Product and Service Diversity

BioMiRu Prefabricated

Based on a recommendation of the 2020 Biogas Market Study, YRE was advised to pilot a fiberglass BioMiRu to test market interest from farmers households and urban households. The advice was also as a way of diversifying biogas models that accommodate various households' ability to pay. Hence potential users and LPOSs have diverse options that would fit into their budget. Nonetheless, the pre-fabricated biodigester is classified as a new design and requires maintenance and repairs that are different from the previous concrete dome type biogas. Maintenance and repairs will be easier for the prefabricated and will be carried out by biogas users themselves by following the steps in taught in the training.

In October 2020, YRE started looking for a water tower plant that can make biogas installations according to the proposed design. From 3 (three) water tank factories, YRE finally choose UD. Ragam Lestari Indah Cemerlang to produce 5 (five) prefabricated BioMiRu made of Polyethylene (PE) and Fiberglass (FB). In December 2020, these installations were installed by BIRU CPO in Tonjong Village, area near Jakarta as demoplot. Additional 20 units of prefabricated BioMiRu are to be installed in Central Java, DI. Yogyakarta and East Java in 2021.

During this reporting period, YRE team has been partnering closely with the Indonesian BSN (the National Standardization Agency) since the end of 2019 to prepare a standard on the procedure for PE biogas installation. This standard will be adopted as a national standard that can be used for stakeholders who have interest to develop PE biogas models. Besides using the PE material, the pre-fabricated



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Picture 3: Design of pre-fabricated BioMiRu.

BioMiRu is also made from fiberglass material as compliance with the regulation of the fiberglass biodigester stated in SNI. 7639:2011. The draft regulation of PE bio-digester has been finalized by the BSN in collaboration with YRE in 2020 and will be formally issued by the end of 2021.

4.1.2 Market Penetration and System in Use

In 2020, IDBP do customer mapping to identify and prioritize potential markets with highest probability of customer acquisition. Utilizing IDBP's database, BPS's data, village potential data and YRE's monitoring information system, the data sets that are used to identify the priority market are as follows:

- a. Population statistic;
- b. Constructed BIRU digesters per village;
- c. Village main commodity;
- d. Main energy for cooking;
- e. Availability of local cooperatives;
- f. Existing community empowerment program;

By overlaying the IDBP Database and Village Potential data, the priority areas directed to CPOs are villages where animal husbandry is the main source of income. There is a total of 386 villages (i.e. 0.46% of all villages in Indonesia) where animal husbandry is the main source of income, and YRE has installed a total of 2,487 biogas

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digesters in 70 (18.13%) of these 386 villages. The 108 villages where no YRE digester, but there are YRE digesters in Province. Hence, CPOs can concentrate on penetrating the rest of the 108 villages. And the rest of 208 villages located in outside BIRU province. This analysis is useful for CPOs as cost saving measure in finding new customers considering the marketing activity that has shown to be more effective is a face to face meeting or on site socialization. By narrowing down the area just from main source of income, CPOs can decide which area to go for.



Chart 1. The distribution of BIRU digesters throughout the villages in Indonesia.



Picture 4. Example area where villages with animal husbandry is the main source of income but no IDBP digester and villages with IDBP digester

4.1.3 Willingness to Pay

IDBP provides a combination of subsidies and loans which makes it affordable for rural households to purchase biogas plants. From 946 units constructed in 2019, 52% users received full assistance through local government budget (APBD), 36% users share the costs with government (DAK/APBD) or private companies' grant through CSR program, and 3% financed their biodigesters independently through credit and cash.

Drovince	BIRU	Gol	Company	100% paid by user	
Province	bio-digesters	Co-finance	Co-finance	Cash	Credit
Lampung	42	0	40	0	0
Banten and West Java	140	9	1	0	9
Central Java & Yogyakarta	262	3	0	4	15
East Java	114	0	105	7	2
Bali	92	0	46	17	0
NTB	135	7	0	12	0
NTT (Sumba & Flores)	4	0	0	0	0
South Sulawesi	136	0	0	3	0
Central Sulawesi	21	21	0	0	0
Total	946	40	192	43	28

Table 1. No. of bio-digesters built in 2020; share with government and company and 100% paid by users.

Government Co-finance

Prior to COVID 19 in the second semester of 2019 YRE team had communicated closely with local governments to secure the Regional Budget at provincial levels to be allocated for the construction of new biogas for the 2020 budget year. This was opted considering the local governments as the major contributor of biogas constructions in the past years. In the first quarter of 2020, the Special Region of Yogyakarta (DIY) had prepared procurement of 200 units of bio-digester for the year of 2020. However, the budget was reallocated for COVID 19 which cancelled out the procurement. Similar situation also occurred in South Sulawesi where YRE had signed a 2 (two) year Cooperation Agreement with the Provincial Government for the construction of 300 units of biodigester per year with YRE providing the subsidy as the co-financing component. Unfortunately, only 30 units of new bio-digester were realized in the year of 2020. The Department of Energy and Mineral Resources of NTB province has allocated budget for the procurement of 600 units of digester, even the prospective users have been assessed for compliance to access these fundings, but unfortunately the budget must be reallocated for Covid-19 pandemic and their support only less than 100 units.

Company Co-finance

In 2020, IDBP has managed to establish 3 (three) collaborations with private sector and community with regard to co-financing of bio-digesters, namely with PT Nestle Indonesia, PT Pertamina (persero) and Pertamina Alumni Community.

Collaboration with Nestle through Corporate Share Value (CSV) Program was extended in 2020. After supporting 110 units bio-digester construction up to July 2020, Nestle continued their support for 300 units bio-digester up to March 2021. To get more biogas construction, Nestle and YRE conducted a joint research to pilot a cost efficient bio-digester model by replacing some of materials (i.e. bricks and sand). The cost reduction of the said bio-digester model made it 20% cheaper than the conventional fixed dome. In November 2020, local masons were trained to introduce BOQ of the efficient bio-digester model hosted by a cooperative in Tulung Agung, East Java.

In last quarter of 2020, YRE and PT. Pertamina (persero) collaborated for the construction of 40 units of bio-digesters and 40 units of Hydroponic in Lampung Province. The program aims to create energy independence, food security and environmental sustainability of households by way of converting of cattle manure to biogas for cooking. Each of the beneficiaries also have a hydroponic system that is fed with the bio-slurry produced by the digesters. Hence, each households have benefited economically from savings from purchasing 3kg LPG, savings from purchasing chemical fertilizers and purchasing daily vegetables consumption.

In addition, as a continuation of cooperation with JOB Tomori in Banggai, Central Sulawesi, 21 bio-digester units have been built in 2019. In 2020, some trainings were conducted for the community and beneficiaries. Activities in 2020 in the Productive Economic Area Development Program through energy conservation and sustainable agriculture in the area of operation of JOB Pertamina - Medco E&P Toori Sulawesi:

- 1. Bio-slurry Fertilizer Utilization Assistance
- 2. Community Capacity Building Training
- 3. Business improvement training: herbal brewing training, VCO and tomato sauce



Table 1. No. of bio-digesters built in 2020; share with government and company and 100% paid by users.



Picture 6. Training to Herbalis Sumber Rejeki

17

STORY 1

Biogas for Household Circular Economy Scheme

In 2020, PT. Pertamina (Persero) MOR II collaborates with YRE to create household circular economy scheme called Desa Energi Berdikari Program in Central Lampung Regency, Lampung Province. This program is one part of the Social and Environmental Responsibility (TJSL) program which aims to create energy independence, food security and environmental sustainability through the processing of cattle waste as biogas feedstock which is integrated with house farming activities through a hydroponic system. A total of 40 units of biogas installation packages will be built with designs that refer to SNI. 7826. 2012 concerning procedures for the construction of a biogas unit with a fixed dome type made of concrete. In addition, the 40 biogas units will be equipped and integrated with the hydroponic system that can be used as a medium for growing vegetables in the beneficiaries' backyard.

PT Pertamina (Persero) as one of the Stateowned Enterprise (SOEs) mandated to assist the Government of Indonesia in providing energy for the Indonesian people, sees the transition to the use of RE as a necessity. Apart from being a function of providing access to energy in of the country, PT Pertamina (Persero) also looks at the sustainability aspect of the use of RE to encourage community independence in managing their own energy with a circular economy system. The circular economic system from the energy aspect is intended to maximize an energy source where the energy produced and its derivative products can be reused by the community for economic improvement and the quality of life of the community. Therefore, PT Pertamina (Persero) took the initiative to encourage the use of Domestic Biogas (BIRU) as one of the REs that encourages a circular economy at the site level as part of the CSR Program for the Independent Energy Village Program of PT Pertamina (Persero).



Construction digester cost sharing with PT. Pertamina





4.1.4. Consumer Awareness & Perception

Awareness of biogas uses and advantages is a key aspect for a proper development of domestic biogas. In IDBP's annual activity of Biogas User Survey (BUS) 2020, it was found that reducing the household expenditure still the main motivation of users to build bio-digester (64%).

To increase the trust of consumers to invest in this technology, public awareness should include general knowledge on the advantages of domestic biogas production as well as technical and economic aspects. Although almost all user in this program have had information about how to use and to maintain biogas digesters, they have less awareness on how to keep their biogas plant well-functioning. This insufficient knowledge may hamper a successful production of biogas and bio-fertilizer.

A bio-digester performance is also determined by the quality of construction on which masons play an important role. IDBP provided 8-days job training on bio-digester installation to the masons who are part of IDBP's CPO partners. A 2-days refresher training is provided after the on job training. This approach is expected to reduce mistakes and increase productivity so that masons can provide highest quality biodigester installation to the end-users. If biogas users are satisfied with their investments, they become effective marketing channels having a large impact on neighboring farmers. Thus, community awareness, training and education, play a critical role in increasing the adoption of bio-digester technology.

4.2 Development of Supply Side

No.	Indicator
4.2.1	Suppliers & Business Networks
4.2.2	Sales Volume
4.2.3	Supply Chain
4.2.4	Warranties
4.2.5	Entrepreneurial SkillS

4.2.1. Supplier & Business Networks

The CPOs are key stakeholders to develop a domestic biogas market, as they deliver a product that has to be of good quality and used throughout its lifetime. The IDBP succeeds in developing institutional arrangements, as companies have been trained on domestic biogas construction to respond the large demand for domestic biogas installations, and finance institutions to provide loans.

In 2020, YRE improve CPO's financial resiliency and agility by providing capacity building or incubation service to the CPOs. This is done through the Biogas Service Center (BSC) component where implemented activities have increased the 4 (four) selected CPOs as BSCs' abilities in analyzing biogas market dynamics as well as improvement of their own internal financial and organizational management. They are: Rumah Ilham (DI. Yoqyakarta), CV. Karsa Tekad Mandiri (East Java), CV. Rizki Abadi (South Sulawesi) and Sangkareang Mason Group (West Nusa Tenggara). Expected target from these Biogas RESCO activities is year-on-year (YoY) revenue increase 8% of each CPOs. Three out of four CPOs increased their revenue more than expected. Only CV. Karsa Tekad Mandiri could not comply with this expected target due to travel restrictions and physical distancing that affect low demand for biogas. Its bio-slurry business was also inactive due to aforementioned Covid-19 related reasons.

To be able to reach a wider area and achieve development targets, YRE invites more local institutions to become CPO. And in 2020 there are 12 new CPOs that have joined as CPO, so the total CPO in BIRU Program become 43 CPOs.

Province	New CPO	Total CPO
Bali	0	3
D.I.Yogyakarta	0	2
Central Java	6	8
West Java & Banten	0	1
East Java	5	11
Lampung	0	3
NTB	1	5
NTT (Sumba)	0	1
South Sulawesi	0	9
Total	12	43

Table 4. Number of CPOs partners in 2019

Although the number of CPOs has reduced in some provinces, the quality of work and the growth of business are being monitored constantly by the PBPO. Trainings on technical updates, quality assurance, by-products and business model canvas were also given to the top CPOs in the hope that their business will continue to grow. As an effort to create more resilient business, trainings on business incubation and acceleration by using social entrepreneurship approach was provided to the aforementioned CPOs Quality Inspectors. Overview January - December 2020 /



4.2.2. Sales Volume

In 2020, from 390 units constructed there are 233 units self-funded by users and 75 units constructed in Central Java through cooperative and East Java partly subsidized by Nestle.

Province	CPO Name	Units
Bali	UD. Cahaya Wana Bakti	1
	Yayasan Manikaya Kauci	4
	Bali Santi	10
East Java	CV. Mitra Bumi Abadi	12
	CV. Karsa Tekad Mandiri	11
	KAN Jabung	2
	Yayasan Suar	1
	KUD Tani Wilis	31
	KPSP Setia Kawan	7
	Yayasan Inisiatif	1
	Tunas Mandiri Mason Group	2
	KUD Sumber Makmur	10
Lampung	Safari Bumi Raya	3
	Regol Mason Group	1
NTB	CV. Triguna Jaya	1
	Solihin Group	21
	Sangkareang Mason Group	65
South	Mitra Sarana Kuba MG	3
Sulawesi	CU Sauan Sibarung	1
	Yayasan Petta Haji Hasbullah	1
West Java	Energi Hijau	2
	Safari Bumi Raya	4
	Ujung Berung Mason Group	7

Province	CPO Name	Units
Central	Rumah Ilham	11
Java & D.I.	BMT Ar-Raudoh	1
Yogyakarta	KPSP Usaha Bersama	3
	KSP Qaryah Thayyibah	3
	Yayasan SPP Qaryah Thayyibah	1
	Yayasan Sion	2
	Yayasan Trukajaya	15
	Mitra Sarana Energi	4
TOTAL		233

Table 3. Number of bio-digesters self-funded by users

It is undeniable that the Covid-19 pandemic and the corresponding Government of Indonesia's (GoI) policy restriction on COVID-19 that was issued since March 2020 contributed to the lower number bio-digester construction.

Another challenge of reaching the target is the constantly rising cost of bio-digester installation. This situation will affect to the biogas demand considering the potential user's ability to pay. To address the problem IDBP since 2019 has designed a BioMiRu. Until December 2020, there are 40 units of BioMiRu in 7 provinces with West Nusa Tenggara as the province that dominates the BioMiRu market. By providing an affordable alternative, the traction for attracting the people (farmers) in need to access biogas will be higher.

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4.2.3. Supply Chain

The biogas supply chain comprises a network between a construction company and its suppliers to produce and distribute a specific product to the end-user. This network includes different activities, people, entities, information, and resources. With the aim of ensuring the development of market-based biogas sector, IDBP has succeeded in developing complete supply chain systemfrom upstream to downstream, that takes account not only the provision of raw materials for construction (sand, cement, brick, stove and other appliances, etc.), but also knowledge and skill development to Construction Partner Organization (CPOs) and certified masons as shown in the diagram below.



Picture 7. IDBP supply chain scheme.

The quality of raw materials (sand, cement, brick stone, etc.) is inevitable for having s good quality biogas digester. To ensure sustainability, IDBP requires the constructions meets the national standard as stipulated in the document of Indonesian National Standard (SNI 7826:2012 and SNI 7927:2013). To support the maintenance of bio-digesters, IDBP is also working with high performing CPOs in each province to establish dedicated Biogas Service Centres (BSCs) that can ensure supply of appliances and aftersales services in order to resolve issues with appliance supply and gaps in CPO service provision.

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4.2.4. Warranties

In ensuring bio-digester installation is being performed in a proper manner and in accordance with the design, the CPOs provide an official warranty for a period of 3 years upon the completion of digester installation. This warranty is spelled out in writing in a household agreement issued by the CPO and should be signed by the user prior the construction starts. The warranty provision is expected to overcome consumer hesitation in installing bio-digester. The bio-digester built by IDBP should meet the minimum quality standard since partners must comply with SNI 7826: 2012 (Indonesia National Standard) in accordance to the procedure of concrete fixed-dome bio-digester installation. To apply appropriate standards, Quality Inspector conducts regular inspection to each bio-digester built by IDBP partners. In 2020, IDBP staff has inspected 283 units out of 390 bio-digesters.

Inspection during the construction (unit)	Inspection after the construction (unit)
47	236

The inspection target in IDBP proposal is 45% of the total bio-digester built in the current year, and the total inspections conducted by QI is 92% of the target in the proposal.

Year	Number of Digester built in year	Total of Digester in year	Total of Digester Quality Check	Completed ASS1	Completed ASS2	Total of After Sales Service Check
2009	62	62	62	62	62	62
2010	1,586	1,648	1,648	1,586	1,586	1,648
2011	2,995	4,643	4,631	2,983	2,983	4,631
2012	3,339	7,982	7,911	3,280	3,280	7,911
2013	3,269	11,251	11,128	3,217	3,217	11,128
2014	2,973	14,224	14,006	2,878	2,878	14,006
2015	2,383	16,607	16,191	2,185	2,185	16,191
2016	3,543	20,150	18,840	2,649	2,649	18,840
2017	2,296	22,446	20,428	1,801	1588	20,641
2018	1,370	23,821	22,363	774	96	21,415
2019	946	24,767	22,775	57	0	21,472
2020	390	25,157	23,043	44	1	22,062

Table 4. Number of Quality Inspection and After Sales Service Quality Check

After sales service is an important activity to secure the continued operation of bio-digesters. The IDBP procedure rules that each bio-digester should be visited by CPO two times, 9 months and 18 months in after complete installation. The objective of the visit is to discharge the obligation of the CPOs to provide maintenance service and collecting information of digester as part of IDBP monitoring. As presented on the Table.6, a total of 22,062 units were inspected from After Sales Service done by CPOs.

4.2.5 Entrepreneurial Skills

Biogas sector development relates to the primary stakeholders in the value chain, primarily the construction companies and farmers who invest in a bio-digester construction consume biogas fuel and use bio-slurry.

Biogas Service Center

CPO (also referred to as biogas SMEs) provide biogas service using BIRU protocols. However, there remain weaknesses in supply and differential capacities among biogas SMEs. In last 2019, we identified strongest CPO in four provinces to develop dedicated appliance supply and aftersales service business lines in order to address gaps in service. These CPOs designated as "Biogas Service Centers (BSC)". Selection criteria was based on performance of each CPOs in pre-selected province and their potential contribution in biogas market development. There are:

- 1. Rumah Ilham in DI. Yogyakarta
- 2. CV. Karsa Tekad Malang in East Java
- 3. CV. Rizki Abadi in South Sulawesi
- 4. Sangkareang Mason Group in West Nusa Tenggara

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Picture 7. Training of Trainer for coordinators BSC.

During the implementation, YRE worked with Kinara, a consulting organization that created modules and delivered Training of Trainers (ToT). The scheme of ToT was at first Kinara conducted training to YRE project officers who would then deliver training for respective BSCs in their provinces. The ToT was conducted after the completion of baseline and needs assessment of the four BSCs. Trainings covered facilitating skills, financial management (bookkeeping, financial planning, COGS), business development (diversification, network mapping, value proposition, growth strategy, solution prototyping), and organizational development (value chain analysis, operation strategy, organizational structure assessment, role allocation, succession planning, and risk management). Afterwards, monthly monitoring sessions were conducted.

As a result, all BSCs now have proper organizational and financial management systems. Product innovation and strategic networking were also part of BSCs progress in 2020. The revenue has increased as well according to their own recorded revenue previous years.

User Training

To ensure the well-functioning of bio-digester, CPOs are responsible in providing one day training on bio-digester operation and bio-slurry production to users at the latest 3 months after completing the installation. Up to December 2020, trainings were provided to 325 users (199 male and 126 female) out of 390 users targeted.

User Training Participants



Chart 2. Percentage Male vs. Female participant of User Training.

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Picture 8: User Training held in group or door to door.

Although a quick know-how on the operation of digester and the stove is provided to each user right after the construction is completed, yet, the BUS survey found that some users still have poor knowledge on feeding management of bio-digesters. A lack of training could affect the functionality of digesters and hamper users to gain maximum benefits from this technology. Series of reminder had subsequently been circulated to CPOs for discharging their duty in building the capacity of users in operating their domestic bio-digesters properly as part of the warranty effort and to utilize bio-slurry as an incentive to maintain its operation and sustainability. A combination of adequate training on maintenance, construction and strengthening the bio-slurry use program is expected to increase the adoption of bio-digester technology.

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Bio-slurry Training

A biogas digester not only provides clean and cheap energy, but also produces bio-slurry as a good organic fertilizer for crops. In 2020, a total of 325 users received bio-slurry training. As shown in Chart 3, the number consists of 199 male and 126 female participants.

Bio-slurry Training Participants



Chart 3. Percentage Male vs. Female participants of Bio-slurry training

4.3 Development of Enabling Environment

	No.	Indicator
	4.3.1	Policy – Stakeholder Engagement
	4.3.2	Access to finance
	4.3.3	Quality regulations, norms and standards
	4.3.4	Market Information
	4.3.5	Gender Mainstreaming Activities
-		

4.3.1. Policy – Stakeholder Engagement

Supportive policies and government initiatives combined with institutional arrangements in IDBP may facilitate information, material and capital flows that connect supply and demand sides of the value chain. While growth in the biogas sector remained slow, the IDBP team continue to seek ways to integrate biogas activities into broader strategies and meet goals. In 2020, 24 consultation meetings were conducted with local/national government to continuously push the agenda on domestic biogas sector. Local governments play important parts in ensuring that legislation is implemented and imposed in the provinces, which make them important intermediaries for ministries and development organizations that aim to reach the rural population. IDBP has also been working with national and provincial governments for the last 4 years to maximize the mobilization of state budget and village budget.

Prior to COVID 19 in the second semester of 2019 YRE team had communicated closely with local governments to secure the Regional Budget at provincial levels to be allocated for the construction of new biogas for the 2020 budget year. This was opted considering the local governments as the major contributor of biogas constructions in the past years. In the first quarter of 2020, the Special Region of Yogyakarta (DIY) had prepared procurement of 200 units of bio-digesters for the year of 2020. However, the budget was reallocated for COVID 19 which cancelled out the procurement. Similar situation also occurred in South Sulawesi where YRE had signed a 2 (two) year Cooperation Agreement with the Provincial Government for the construction of 300 units of biodigester per year with YRE providing the subsidy as the co-financing component. Unfortunately, only 30 units of new bio-digesters were realized in the year of 2020. The Department of Energy and Mineral Resources of NTB province has allocated budget for the procurement of 600 units of digester, even the prospective users have been assessed for compliance to access these fundings, but unfortunately the budget must be reallocated for Covid-19 pandemic.

Despite budget reallocation by the Provincial Governments, the District Governments on the other hand had shown commitment to the IDBP. The government of Wajo District in South Sulawesi signed a grant agreement with YRE to construct 11 units of new bio-digesters. Other provincial governments such as the Department of Energy and Mineral Resources of NTB also follow suit although for fewer units than initially planned which was committed for 100 units.

Meanwhile, to maintain the project activity going YRE team had also managed virtual coordination by conducting a webinar, training, promotional event, FGDs and policy advocacy to the government and main partners (CPOs and LPOs). The purpose of adjusting to these alternative activities is to maintain the momentum for biogas in the midst of other competing issues affected by COVID 19 such as food resiliency, small medium enterprise, and economic recovery in general. The topics of each event was infused with popular issues including COVID 19 impacts on biogas sector; trainings for CPOs to maintain financial resiliency during the pandemic; bio-slurry's contribution to food and economic

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resilience of farmers in times of pandemic; smart biogas innovations for CPOs and LPOs; data science for development program expansion; bio-slurry as solution for Indonesia's recurring issue of chemical fertilizer subsidy burden; etc.

The events were conducted for not only existing IDBP partners, but also potential partners such as corporations, academics, start-ups, local communities, NGOs, digital payment providers (i.e.

Duithape, DANA, Inkopdit), etc. From policy advocacy activities there are several notable achievements, namely; i) support from the Ministry of Cooperative and Small Medium Enterprise (MCSME) in facilitating the distribution permit for IDBP CPOs (KUD Sumber Makmur and CV Riski Abadi); ii) joint submission of a funding proposal by YRE, HIVOS, and MEMR to be submitted for funding from MoEF and BPDLH; iii) series of discussion on National Biogas Roadmap development lead by MEMR.



STORY 2

Provision of Appropriate Biogas Technology in Empowering Village Communities Post-Covid-19

The Force Majeure event of the COVID-19 pandemic that has taken place since March 2020 has resulted in a decline in the economic level of the community in all locations. In relation to the biogas sector, this pandemic has also contributed to the reduced interest of potential users to access the construction of a Domestic Biogas reactor due to economic difficulties in the period from March to May 2020. Even though appropriate technology for domestic biogas is expected to be one of the solutions in improve the community's economy, especially in rural areas after the COVID-19 pandemic. It has been proven that biogas users in Central Java/DIY, East Java, NTB and South Sulawesi do not experience difficulties in accessing cooking energy and access to fertilizer for agricultural land. In overcoming this, the use of government funds, one of which is the Village Fund, is actually expected to be one of the solutions for community access opportunities to adopt appropriate biogas technology. However, at this time the allocation of funds must be diverted to handling the COVID-19 pandemic. Likewise with the allocation of other funds. So that the plans that have been prepared jointly between YRE and the Regional Government for the allocation of the construction of household biogas reactors that have been prepared must be postponed.

To prepare BIRU Program Partners post-pandemic, YRE conducted an Online Biogas Technology Provisioning Training (ToT) for BIRU Program Partner Institutions. The training consisted of providing knowledge on technical descriptions and the potential use of Concrete Dome and BioMiRu reactor technology in improving community welfare as well as discussing opportunities for the dissemination of the Biogas Program through Village Fund. This activity has been carried out on 30 June and 1 July invited the participation of institutions Community and Village Empowerment Service and Experts – Appropriate Technology from the level Province and County.



Webinar Provision of Appropriate Biogas technology supported by Ministry of Village.

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4.3.2. Access to Finance

During 2020 there are 75 units bio-digester built by credit scheme from 2 provinces: East Java and Central Java only with total loans disbursed is EUR 26,127. Since the beginning of the program, the loan for domestic biogas has supported 9,235 farmers (37 % of total domestic biogas construction 2009-20019) or a total of EUR 2,737,001.

Province	No. of biogas with loan in 2020
East Java	68
Central Java	7

Table 5. Number of bio-digester constructed with loan in 2020 per province.



Contribution Portion

Chart 4. Contribution Portion from 2009 - 2020.

Based on chart 4, number of household installed biodigester through loan has been decreasing since 2012. This is because the number of farmers who have the ability to pay and pass the credit assessment to build bio-digester is also decreasing.

The graph of movement of loan was inversely proportional to the number of households that installed bio-digester with financing from Gol (full subsidy or cost sharing). As the number of bio-digester installed with support from Gol was increasing year by year until 2018, the loan contribution was decreasing. After the absence of DAK from the central government, the number of government supported bio-digester is decreasing and the loan contributed bio-digester starts to raise again.

In 2020, collaboration with Nestle through Corporate Share Value was extended. But the progress of new constructions in East Java have been somewhat below expectations. Several factors which affected such progress are as follows:

- Higher price biogas due to the higher price of material in new locations).
- Insufficient numbers of CPOs in the newly identified area. In the early stage of the program, Nestle focused its efforts on the central area of

East Java Province, and subsequently there are 13 CPOs established in this area. Currently, almost all farmers in this area have already owned biogas. On the contrary, the condition is different in the western and eastern part of East Java as there is only one (1) CPO in those areas which might impact the construction acceleration.

 Five (5) existing CPOs are inactive due to a saturated market in the central area of East Java. As a mitigation measure, IDBP will involve 35 Nestle dairy suppliers to become CPOs in 2021. However, currently there are only 10 out of 35 dairy suppliers working under the IDBP.

The following are actions taken by YRE to mitigate those factors:

- Nestle and YRE conducted a joint research of a biodigester demo plot with the objective of reducing the cost per unit of bio-digester by replacing some of expensive materials (i.e. bricks and sand) while at the same time still maintaining the quality of biogas. The cost reduction of the biogas installation made it 20% cheaper than the prior model.
- With intervention from Nestle, make Nestle milk supplier in the eastern part of East Java to join as CPO
- Involving as many Nestle milk supplier as CPO

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The biogas loan disbursement from Credit Union partnerships are also slowing down as many primary CUs, especially in Central Java, East Java, South Sulawesi, and NTB Provinces have not been engaged as IDBP LPOs because the CUs are still looking for biogas market potential among its members.

In 2020, YRE has proposed several alternatives for the Rabobank Foundation guarantee scheme. First, the Rabobank Foundation is to consider a secondary cooperative network to be IDBP's biogas loan aggregator. Building partnership with an institution that oversees the cooperative network would also be a good option.

The proposed potential institutions including GKSI (dairy cooperatives network), INKOPSYAH/ PUSKOPSYAH (sharia-based cooperatives network), INKOPDIT/PUSKOPDIT (Credit Union network) Jatra Miguna, Qarriyah Tayyibah (a foundation that oversees some primary cooperatives) and Nasari Cooperative (online-based cooperative network). Working with a secondary cooperative network may prevent the risk of the inequality between financial institutions. Prospective aggregators that comply with Rabobank Foundation criteria are PUSKOPDIT Jatra Miguna Yogyakarta because they serve both CUs and primary cooperatives. However, Qaryah Tayyibah and Puskopsyah only cover the Central Java area and thus

cannot cover all IDBP areas. Rabobank Foundation encourages PUSKOPDIT Jatra Miguna to share the same area of IDBP.

YRE also conducted socialization meetings with several potential Primary CUs, such CU Karya Mandiri in NTB province, CU Anak Mandiri Ponorogo, PUSKOPDIT Ponorogo, CU Gema Swadaya Lumajang in East Java province and CU Sauan Sibarrung in South Sulawesi province. As a result of these efforts, CU Karya Mandiri in NTB had built a BioMiRu as demo plot through CU in November 2019. CU Sauan Sibarrung in South Sulawesi afterwards became a CPO in the second semester 2020 and already built 2 units bio-digesters.

Another biogas financing option that YRE has been following up on since October 2020 is *Lembaga Pembiayaan Dana Bergulir* (LPDB) under the MCSME. YRE has proposed 9 (nine) potential LPOs from various biogas credit schemes in Central Java, East Java, NTB and South Sulawesi provinces to be incorporated into LPDB's 2021 lending pipeline. In early November 2020, the 9 (nine) cooperatives had been approved to be in LPDB's pipeline. Following up to the approval, YRE had been assisting each cooperative in their proposal-making process, preparation of supporting documents, and submission process to LPDB. Three (3) cooperatives in Central Java will submitted the document required by LPDB.



STORY 3

Financial Action Learning System (FALS) Training

The implementation of the BIRU Program in 2019 - 2020 also requires an indicator of gender equality in the marketing of Biogas Rumah technology. This is also an effort to achieve the 5th SDG target. For YRE, efforts to fulfill gender equality in the BIRU sector are also a continuation of the implementation of the Gender Action Learning System (GALS) which has been implemented in marketing the Biru technology in the GADING and TERANG Program in the 2016-2017 period in DI Yogyakarta, West Nusa Tenggara province and East Nusa Tenggara (Sumba Island). So YRE intends to continue the provision of knowledge on gender equality in the BIRU Program which focuses on financial management, both in families and institutions. This methodology is the Financial Action Learning for Sustainability, or FALS.

During the COVID-19 pandemic as well as the social restriction policy as an effort to reduce the spread of this virus, it has resulted in a decrease in the economic level of the community in all locations. In terms of financial business, this pandemic also contributed to the reduction in liquidity due to the withdrawal of public savings / savings funds in financial institutions, particularly in Cooperative Microfinance Institutions. In connection with the biogas sector, this pandemic also contributed to the cessation of potential user interest in accessing biogas credit facilities and building a BIRU reactor in the period March to May 2020. Current conditions make Microfinance Institutions need to study the FALS methodology as an alternative to financial literacy education (Aware of Managing Money). On 8, 11, 12 and 13 May 2020, and on 8 – 12 June 2020 Yayasan Rumah Energi through the Rumah Biogas Program has conducted an online gender empowerment based ToT FALS training program. This has never been done before and is different from the gender-based training methods which are usually in the form of face-to-face and group participatory discussion. This is because it follows the provisions of the PSBB policy of the ongoing COVID-19 pandemic.

Broadly speaking, the online trial of the FALS training activity was successfully carried out and achieved the desired goals and outputs.The technical inhibiting factors during the activity were only derived from internet connection signals which were sometimes not good in some of the participant areas. This caused some participants to not be able to participate in training sessions to the full.

However, this obstacle can be overcome by cooperation and mutual assistance between good participants. This activity was positively appreciated by the participants.





4.3.3 Quality Regulations, Norms and Standards

A good quality of biogas installation is necessary in order to produce and maximize the production of cooking gas. Thus, IDBP and the government of Indonesia have established a regulation that stipulates on the SOP/procedure of building and operating biogas system. The SOP is registered as Indonesian National Standard (SNI. 7826 issued in 2012) which stipulates on the know-how of building and installing fixed dome biogas with the concrete material. This SOP is completed with another registered standard of SNI. 7927 issued in 2013 on the supporting appliances for biogas installation.

To accommodate communities' needs in accessing renewable energy through organic waste utilization, IDBP team designed a biogas technology innovation from polyethylene (PE) material. The tech is called BioMiRu (Biogas Mini Rumahan/Mini Domestic Biogas) that offers cheaper construction cost and requires a smaller construction area in meter square. By using PE material, BioMiRu is able to accommodate any organic waste, especially kitchen waste. Therefore, BioMiRu is suitable for urban communities who wish to turn their kitchen/household waste into gas and organic fertilizer to support urban farming.

To increase BioMiRu's quality, IDBP together with National Standardization Agency (Badan Standardisasi Nasional/BSN) and DGNREEC of theMEMR conducted research series since late 2019 in order to establish national standard on the technology labelled as SNI (Indonesian National Standard) by end of 2021.

Throughout 2020, YRE together with BSN in particular the SNI team had conducted a series of virtual meetings starting from Q2 2020. The meetings aimed to design technical guidelines (related to the procedure of Biogas PE installation scheme) the SNI content and each of SNI content drafted by the team will be presented to the internal team by a representative(s) from MEMR. Each meeting was conducted to gather inputs and information to complete the SNI draft.

The SNI team also conducted site visits to collect field information related to the detailed installation PE digesters design. The SNI team conducted 2 (two) FGDs in the end of 2020 for final input as well as information and evaluation from the external participants e.g. MEMR, academics, biogas expert, biogas contractors, and biogas users as stakeholders for the standardization of low pressure biogas installation.

4.3.4. Market Information

Market Information means the information for Direct Marketing purposes. This is necessary to understand the intended target market so that we know how the strategy for the product to be marketed. In the implementation of the biogas marketing strategy, the marketing 5 Ps are carried out, in which there are 5 important marketing instruments, namely: product, price, place, promotion & people.

In terms of products, BIRU technology has an advantage over other biogas variants because it is in the form of a dome-shaped dome made of bricks and concrete but embedded underground, allowing it to avoid physical damage and save space. Then in terms of price, BIRU technology is more profitable because it is considered a long-term investment. Place – BIRU technology is marketed offline and online. People – Offline BIRU technology is promoted through Construction Partner Organization (CPO), Promotion – while online marketing penetration is through digital promotions using multi-platform.

In term of promotion, IDBP is using social media platforms for wide engagement with the public that allow discussions, incorporate new ideas and foster learning. IDBP has a website as a means of communicating programs and other information to the wider community and stakeholders, while Instagram and Facebook to reach its audience for community awareness raising. In addition, additional platforms such as YouTube and podcasts are also used to maximize the IDBP campaign.

Digital Campaign & Promotion

Social media is one of the significant campaign elements, especially for CSOs engaged in campaigning and public policy. Social media is usually a tool to share information, education as well as a platform to garner public support. However, the involvement of social media in the IDBP is also quite important because it functions as a means of communication link with potential biogas users and users, a means of information and education, and a means to expand outreach through campaigns and collaboration.

The campaign strategy through social media carried out in the IDBP includes several platforms, namely: Instagram, Facebook, YouTube, and Spotify Podcast. Although several platforms have different audiences, synchronizing content, especially on Instagram and Facebook platforms, is quite effective in inviting

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interaction. The following is detailed information regarding IDBP campaign on several platforms:

• Instagram

The campaign strategy of synchronizing Instagram and Facebook content is quite effective in getting interaction from viewers. Even though the content displayed is the same, there are different responses based on the characteristics of the viewers on the two platforms. On Instagram, the popularity of IDBP is not yet widely known by viewers, so objectively the strategy taken is to introduce IDBP through biogas technology content with a narrative that is built with an emphasis on informative and educative content. Based on this strategy an average reach of around 9.000 people and an average impression around 20.000 people. Even so, there are no direct purchases or transactions that occur through this promotion method. The conclusion from these results indicates that the strategy of popularizing the BIRU program through Instagram is effective in attaching home biogas branding to the BIRU program, but this popularity has not been able to convert viewers who are exposed to information and education related to biogas into new biogas users or also significantly increase the number of new biogas developments.



Picture 9. Content Sample of Rumah Energi on Instagram in 2020.



Chart 5. Reach and Impression of Rumah Energi on Instagram during 2020.

Facebook

Meanwhile, viewers on Facebook tend to have been exposed to IDBP, so the strategy used tends to be hard-selling in the form of distributing electronic brochures, success stories, to information that is an invitation to use biogas.



Picture 10. Content Sample of Rumah Energi on Facebook in 2020







Promotion thru Biogas Rumah Page reached 22,437 users, 15,948 attachments, and 6,900 liking users. The conclusion from the engagement that has been built is that the IDBP content on Facebook is able to attract public attention so that it creates intense interaction with viewers. However, the viewers' decision to build biogas is still determined by several other factors, such as: the ability to pay, the scope of the BIRU program, or regional policies that have not accommodated the interests of potential users.

• YouTube & Podcast

The explanation of the IDBP and BIRU technology is carried out through the Rumah Energi YouTube channel. The role of Search Engine Optimizer (SEO) on Google with the keyword "biogas" in the search field will direct viewers to the BIRU Branding program. This automatically raises search recommendations on the Rumah Energi YouTube channel which contains videos related to biogas technology.

Meanwhile, Podcast is a new way to provide information and education through the discussion method. Podcasts became popular in Indonesia in 2020. Therefore, in early 2020 one of the campaign penetrations was carried out through podcast media on Spotify under the name Podcast Energi. During 2020 Podcast Energi already has 9 episode with 652 plays, with average age 18-22 and 23-27 years old as the most listeners.

Although the campaign is quite helpful in increasing the audience for IDBP, YouTube and podcasts are not effective enough to increase sales.

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According to the 2020 biogas user survey (BUS) report conducted on 100 biogas users, 97% of the communication channels used were WhatsApp chat applications, 69% for Facebook and 26% for Instagram. Through these data, it can be analyzed that the promotion strategy through social media does not yet have a great opportunity to increase the sales of biogas.

Collaboration

In relation to marketing and promotion activities, a collaboration strategy is carried out as an effort to open opportunities to introduce IDBP to collaborators and the audience of these collaborators. The collaboration strategy is carried out through offline and online events. Several offline event plans had to be postponed, canceled, or changed to online events due to the COVID-19 pandemic that attacked Indonesia in mid-March 2020, resulting in the government having to impose activity restrictions.

However, one collaboration event was successfully held in February 2020 in Solo, Rumah Energi had the opportunity to become a collaborator for the program 'Ruang Energi' organized by MEMR. This activity aims to disseminate job opportunities in the field of renewable energy or green jobs especially biogas for university graduates and also entrepreneurs who want to build start-ups.



Picture 12. Session on Ruang Energi by Kementerian ESDM.



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We also make an official partnership with Lingkar Temu Kabupaten Lestari (LTKL). LTKL is district government associations for mutual cooperation to create a maintained environment and a prosperous society. Through this partnership LTKL together with the Rumah Energi Foundation implement an economic scheme sustainable with biogas as the driving base with the theme "Community-Based Sustainable Economy" thru 8 units of biogas digester capacity of 4 m3 built in this project.



Picture 13. Partnership with LTKL.

• Webinars Series

When the COVID-19 pandemic began to hit the country, many activities were shifted to online. In order to adapt to the situation, Rumah Energi has begun to shift activities that are offline events into online events, one of which is webinars. This series of webinar activities was carried out as a form of campaign activity related to general organizational branding because the participants who participated were from all walks of life.



Picture 14. E-poster webinar series.



Picture 15. Documentation of webinar in 2021.

Webinar in collaboration with UMN: Food Waste not Wasted

The background of the Food Waste not Wasted webinar is that many people are not aware of the dangers of not eating food, even though its existence can be a real threat if it is not managed properly. Rumah Energi collaborates with Multimedia Nusantara University guided by Prita Laura to hold online discussions, to provide a point of view in solving the problem of food waste.



Picture 16. E-poster of webinar collaboration.

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Kak saya tadi mengikuti diskusinya, bagaimana jika ingin mengetahui lebih lanjut soal biomiru? 21

Picture 17. Audiences response in webinar collaboration.

This collaboration received a positive response from the participants who attended. After the event was over, there were several enthusiasts to build Mini Home Biogas (BioMiRu). This interest is then followed up with the development partners for further communication.

• Digital Fundraising

In 2020 YRE tried to do individual fundraising through the crowdfunding platform such as kitabisa. com and benihbaik.com. The story we highlighted was the struggling of Seko citizen for biogas and the East Java farmers during covid-19 pandemic. In total through this campaign, YRE collected almost IDR 1 million. The title of the crowdfunding page:

- Help the Community in Seko
- Help Pak Rokim

Based on the analysis obtained regarding digital fundraising, biogas development cannot yet become the main issue in digital fundraising. Several factors have caused this strategy to not work, one of which is because the issue of renewable energy has not become a major concern in Indonesia. Apart from the fact that in terms of environmental issues, renewable energy is still less popular than issues of natural disasters and environmental conservation, renewable energy, especially biogas, is still quite foreign to the people of Indonesia.

4.3.4. Gender Mainstreaming Activities

IDBP tries to take a comprehensive approach to gender equity in decision making, credit access, construction, operation and maintenance, training and benefits from biogas. These areas are monitored in our annual Biogas User Survey, and are associated with specific targets.

In 2020, the program activities carried out are not only digester construction, training on the use of biodigesters for households and increasing CPO capacity. YRE also conducted Gender Action Learning System (GALS) training 5 households that also have a bioslurry business. The training was held in DI. Yogyakarta on November 2020 and in West Nusa Tenggara on December 2020. The selection criteria for those who received GALS training are based on their activeness in the promotion of their business and also how they do their business. The training objective is for biogas users to have a clear business goal and plan.



Picture 18. GALS Training for households in West Nusa Tenggara and DI. Yogyakarta

05. Biogas User Survey (BUS) 2020

The Biogas User Survey (BUS) is an important instrument to measure the satisfaction rates of users towards biogas, to check the technical performance of the digesters and to use the result as the source of carbon monitoring of IDBP. In 2020, IDBP conducted BUS with samples consist of users with 11 cluster year of bio-digester use from 9 provinces in Indonesia (West Java, Central Java, D.I. Yogyakarta, East Java, Lampung, South Sulawesi, Bali, West Nusa Tenggara and East Nusa Tenggara), based on methodology settled by Gold Standard. The field survey is conducted by Jakarta Research Institute (JRI Research) toward314 of biogas user households who are still using biogas from VPA 2 (users of biogas from January 2017 to June 2020) and VPA 1 (users of biogas from July 2009 to December 2016) with the following sample distribution:

	Year of Usage	Completion date of biogas plant construction	Total completed interview
	Year – 1	July 2019 – June 2020	36
VPA 2	Year – 2	July 2018 – June 2019	31
	Year – 3	July 2017 – June 2018	32
	Year – 4	Jan 2017 – June 2017	24
	Year – 5	July 2015 – Dec 2016	25
	Year – 6	July 2014 – June 2015	16
	Year – 7	July 2013 – June 2014	29
VPA 1	Year – 8	July 2012 – June 2013	30
	Year – 9	July 2011 – June 2012	29
	Year – 10	July 2010 – June 2011	29
	Year – 11	July 2009 – June 2010	33
	Total Households		314

Table 6. Distribution of BUS samples by year

The result of BUS gives the Program management and stakeholders, including the users, insights in the reliability and success of the biogas sector development approach as it is aimed on sustainable use of the biogas technology as introduced by the Program. Not only survey to Users from fixed dome bio-digester, BUS 2020 also survey to 6 BioMiRu users to meet the requirement from Gold Standard.

The result of BUS described as follows:

a. User Satisfaction

The result of BUS 2020 shows that almost all households (88%) are satisfied with their biogas plant, in terms of the quality of appliances, and the services or help provided by CPO.

b. Motivation of User - build bio digester

The most prominent motivating factor for having bio-digester was to reduce household expenditures (64% samples). The next driving factors for having bio-digester are because subsidy provided, reduction in firewood collection and less effort to have energy.

	TOTAL	VPA-2
BASE: Total respondents of 1-4 year of use	123	123
Reduction in household expenditures (oil fuel, fertilizer, etc)	64%	64%
Subsidy provided	29%	29%
Reduction in firewood collection	14%	14%

Biogas User Survey (BUS) 2020

	TOTAL	VPA-2
Less effort to have energy	14%	14%
Use of bio-slurry as fertilizer	13%	13%
Improve hygiene of barn	13%	13%
Because it can be paid in credit scheme	11%	11%
Faster cooking	11%	11%
Reliable energy supply	11%	11%
More safety	8%	8%
Smokeless kitchen	1%	1%
Others	11%	11%

Table 7. Motivation for installing bio-dogester fixed dome.

In regards to motivation to own biogas plant, the survey only targeted to the users of Year-1 up to Year-4 of usage (115 households). This question is no longer asked to the old users.

Base : Bio Miru users	6 (n)
Reduction in household expenditures (oil fuel, fertilizer, etc)	4
Subsidy provided	2
Faster cooking	1
Use of bio-slurry as fertilizer	1
Less effort to have energy	1
Reliable energy supply	1

Table 8. Motivation for installing BioMiRu.

In regards to motivation to install biogas plant, the survey only targeted to the users of Year-1 up to Year-4 of usage (123 households). This question is no longer asked to the old users.

c. Benefit of Bio-digester

Most of respondents said that biogas plant brings various benefits, including the reduction in household expenditure is considered as the most important benefit for most of households (61%) especially among the new users (VPA2: 67%, significantly higher than VPA1: 57%). Meanwhile the use of bio slurry for fertilizer, only considered as one of important benefits by 19% users (24% of new users/VPA-2; and 16% of older users/VPA-1), and as the most important benefit than others by 2% users only.

	TOTAL	VPA-2	VPA-1
BASE: Total Households	314	123	191
Reduction in household expenditures (oil fuel, fertilizer, etc)	61%	67%	57%
Less effort to have energy	9%	4%	12%
Reliable energy supply	8%	9%	7%
Faster cooking	7%	6%	7%
More safety	4%	2%	6%
Reduction in firewood collection	4%	2%	5%
Improve hygiene of barn	3%	4%	3%
Use of bio-slurry as fertilizer	2%	3%	2%
Smokeless kitchen	0.6%	-	1%
Because it can be paid in credit scheme	0.3%	-	0.5%
Subsidy provided	0.3%	-	0.5%
Others	2%	3%	1%

Table 9. Benefits of biogas digesters.

Base : Bio Miru users	6 (n)
Reduction in household expenditures (oil fuel, fertilizer, etc)	3
Reliable energy supply	1
Others	2

Table 10. Benefits of BioMiRu.

d. Benefit received, in relation with gender equality

Energy poverty strongly affects the individual's living and social conditions and undermines educational and business opportunities. In this survey, almost half or females and males said they have more spare time to take care of their family after having biogas. They also can use their free time for chatting or getting around with neighbors, and to do other social activities and income generating activity. Those who have the interest in using their spare time on education-related activities (course, accompanying the kids when studying) is relatively low. Only 18% of females and males have interest to spend their time on educational activities. Further details can be seen in the following table.

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Biogas User Survey (BUS) 2020



Chart 7. Utilization of spare time derived from installation of bio-digester.

e. Impact of bio-slurry on agriculture production

Bio-slurry resulting as a waste from dung anaerobic process inside the reactor for producing biogas is a very good organic fertilizer. It has been proven that the use of bio-slurry for fertilizer can increase the harvest results. Regarding the use of bio slurry as fertilizer, apparently, the most noticeable impacts toward their plants are:

- The soil more loose and fertile (94%)
- Quality of their harvest results better (89%)

After using bio slurry as fertilizer, most farmers (65%) said that they got better result on their farming productivity. The yield increased for 45% in the average, or 185 kgs a lot more than usual – for the average.

A better harvest will increase own consumption, increase income or both. Bio-slurry can also be used to sell to other farmers, i.e. as a trading commodity, but only 3% from total 278 households use bio-slurry as their additional income source by selling it.

f. Impact on energy, emission reduction and environment

The biogas program is not only to support biogas users about environment friendly management of livestock waste, but also to reduce the use of fossil fuels and firewood, avoid greenhouse gas emission, deforestation and global warming.

From the survey, 76% biogas household said that their bio-digester can always fulfill their need of energy. And there are 24.5% biogas households no longer using LPG. Overall, saving on LPG usage after having bio-digester can up to IDR 199,992 decrease per month.

IDBP program, definitely has been decreasing the number of firewood stove users significantly. From 251 biogas households who use firewood stove before having bio-digester, significantly reduce to 156 biogas households who are still using firewood stove after having bio-digester. On average, a decrease in firewood consumption reach 5.2 kg per day per household.

Biogas also brings impact to the cleanness environment. After having bio-digester, 62% biogas households mentioned that their kitchen is now cleaner. Likewise, for the cattle shed and the surrounding environment, most biogas households believe that they are now cleaner (65%).

06. **Geotagging Activity**

Since the inception of IDBP in 2009, the program is supposed to check the quality of at least 27% of the bio-digester built under the program. This goal was set in the first proposal of IDBP as advised by SNV (which had done the feasibility study for this project in 2008). In addition, since 2012, it is considered important that the spatial coordinates of each digester is registered to ensure that anybody can find the digester easily based on the GPS coordinates to enable easy verification of the existence of any digester in the database. Current technology allows the collection of these coordinates at an affordable price by using GPS equipment or a smartphone with the right software installed. Each digester constructed must be recorded into the database; a robust database system was developed which is routinely updated by collecting and processing data on new digesters (intake, household agreements and completion reports), user training information, Quality Inspection visits and After Sales Services (ASS); which allows IDBP to monitor the performance of the digester during warranty time, and for easiertracking in case any issue occurs.

IDBP has conducted the geotagging activities since 2018, it aims to identify the bio-digester existence in each IDBP provinces. The result has shown that all off bio-digesters are existing, but the other issue that has to be solved is the nonfunctional bio-digesters. There are many reasons which made a bio-digester no longer used by the owners. IDBP divides it in to two categories, a technical matters due to the bio-digester damage (hard or light), and a non-technical matters due to the cattle no longer exist (sold), or the user do not want to use biogas any longer.

In standard operation, IDBP regulates the following things that are carried out in the program to minimize the malfunction of the bio-digester, there are:

- Ensure that the masons who build the bio-digester are masons who have been trained in the IDBP program
- 2. Quality inspection do by the Quality Inspector Officer after the construction of the bio-digester
- 3. Operation and maintenance training is provided to all bio-digester households
- Bio-digester households also provided with the user manual, includes the contact of the CPOs and IDBP hotline
- 5. Maintenance visits are carried out by the CPOs 2 times in 3 years



The total of a technical matters are 1,415 unit digesters in eight IDBP Provinces. The issues for non-functioning with technical matters vary as follows:

	Technical Issues	No. of bio-digester
Lightly damaged	piping issues, broken stoves, leaking on water drain, broken gas tap, broken mixer, etc.	696
Heavily damaged	cracking in inlet and outlet , cracking dome	719

Based on the result, IDBP decided to repair biodigester with light damage in 2020. Unfortunately from 696 users with light damage bio-digester, only 381 users committed to reutilize the bio-digester after reparation.

Here are challenges faced by the IDBP teams during conducting the reparation activity in 2020, such as:

- Due to the initial data had compiled by the previous team (it is not the same team who conduct the reparation activity) was not clear enough, thus some of the reparation team had to reconfirm to the users to collect sufficient and real issue on field.
- Different technical issues founded, when the reparation teams had visited to user place, thus the reparation team had to rearrange the reparation strategy (i.e. light damage is reported in the data base, but the heavy damage in the real situation).
- 3. User was not at home, though the appointment had scheduled before.
- 4. User (elderly people) would not want to use the biodigester any longer.
- 5. User had sold the cattle.



Picture 19. Reparation activities did by the CPOs

In order to start a next reparation phase in 2021, the IDBP team is trying to collect update information through the available existing database that had compiled before, and trying to reconfirm each user, whether those users would like to use their biogas or they do not want to use it. Some of information that has to collect, such as:

- When the broken biogas installation had first occurred and identifying after constructed (is it less than 3 years, or after 3 years). This is for the consideration to repair or not. This also can be done by tracing at the existing completion report database.
- 2. The identification of damage caused by unproper installation, or it broke by the user itself.
- To replace and adjusting the initial database which mentioned a light damage part into the heavy damage (it occurred due to improper identification during the first survey).
- To recalculate the cost estimation that will be using for the next reparation, especially for the heavy damages.

Considering the availability of field resources, distances among each area, pandemic situation, and construction acceleration activity, IDBP targeted to repair 100 units of heavy damage bio-digesters in 2021.

07. Bio-slurry Value Creation

One of the outputs of a bio-digester, next to the biogas, is bio-slurry. This is the effluent of the organic matter remaining after the anaerobic digestion process that can be used as good organic fertilizer for crops. The result of Biogas User Survey (BUS) in recent years found that users are willing to have bio-digesters not only for access to clean cooking but also for the bio-slurry.

Based on Biogas User Survey Result in 2020, there are 62% biogas households used bio-slurry for some kind of purposes. The rest of it do not using bio-slurry with several reasons: the land farming is too far, do not have time to collect bio-slurry and using chemical fertilizer consider as more practical than using bio-slurry.

On April 23, 2020, YRE held a webinar "Indonesian Food Security during the Pandemic Period". The purpose of this webinar in addition to sharing knowledge and experiences around food security strategies independently during the pandemic. And it also to promote bio-slurry as a support to meet the needs of basic commodities independently.



Picture 20. Webinar Indonesian Food Security during the Pandemic Period

In the last 2019, YRE has chosen 4 strongest CPOs in 4 provinces to develop dedicated appliance supply, aftersales service business lines in order to address gaps in services and also bio-slurry business development. These CPOs designated as Biogas Service Center. From 4 BSCs, only 2 BSCs that success in bio-slurry business. They are Sangkareang Mason Group in West Nusa Tenggara and CV. Rizki Abadi in South Sulawesi.

CV. Rizki Abadi, South Sulawesi

During the Covid-19 pandemic, biogas construction which had previously been budgeted for by the South Sulawesi Provincial Government was diverted to Covid-19 emergency funds. This condition makes CV. Rizki Abadi must perform maneuvers to keep business activities running. Then in July 2020, CV. Rizki Abadi shifted its main activity to the development of the Bioslurry business.

In this bio-slurry business, CV. Rizki Abadi collaborates with a farmer group in Loka Village, Rumbia Subdistrict, Jeneponto District as a supplier of raw materials for the bio-slurry they sell. A total of 26 members of farmer groups who supply liquid bio-slurry to CV. Rizki Abadi.

Until November 2020, 90 bottles (90 liter) of Biosvid-19 (product of bio-slurry by CV. Rizki Abadi) has sold. Biosvid-19 has a target market segment for ornamental plant activists and urban farming and is currently well known by consumers from various regions. This brand has gone through a laboratory test process at the Center for Agriculture and Food Crops with the number SP 81 P/L-BPTP/VII/2020.



Picture 21. Biosvid-19, bio-slurry product produced by CV. Rizki Abadi

In December 2020, CV. Rizki Abadi also has been chosen as one CPO who will receive support facility for bio-slurry business. The other CPO who receive this support facility is KUD Sumber Makmur in East Java. The Bio-slurry Support Facility (BSF) is a financing facility that provides grants to the CPOs to help them expand their liquid and solid bio-slurry business. There are several key interventions designed for the CPOs for their bio-slurry business to thrive which will be supported by the grants given from Endev. A storage facility, processing equipment, mandatory permits, and lab tests will help the CPOs in increasing the quality of the products and outreach to wider markets.

Sangkareang Mason Group

The bio-slurry business run by the Sangkareang Mason Group began with concerns about the scarcity of subsidized fertilizers in NTB and the lack of farmers using organic fertilizers in cultivating their agricultural land. This encourages Sangkareang Mason Group to cooperate with parties who care about agriculture that prioritizes environmental and sustainability aspects.

There are 2 (two) parties invited to cooperate by Sangkareang MG, namely Mr. Samad who is a bioslurry businessman since 2016 who has been selling products in the Jonggat Subdistrict, Central Lombok District and CV. Triguna Jaya (King of Worms) who developed the lumbricus rubellus worm in West Nusa Tenggara.

There are 2 business models used in the collaboration:

- With Mr. Samad, Sangkareang Mason Group as a reseller of bio-slurry fertilizer products in the West Lombok and Mataram areas;
- With CV. Triguna Jaya became a partner in developing the lumbricus rubellus worm which was then sold to them at an agreed price, while used vermicompost was packaged for sale in Central Lombok and West Lombok.



Picture 22. Vermi-compost product.

During the pandemic their business development has increased. There is a huge demand from urban agriculture in urban areas, especially for horticultural plants such as chilies, tomatoes and pokcoy and indoor flowers that do not really need sunlight. And testimonials from all users of fertilizer products are very satisfied with the results. Since March 2020, the increase in the need for organic fertilizers occurred in August - December 2020, they can sell up to 50-60 bags (10 Kg/bag) for 20 thousand rupiah / month or around 1 million to 1.2 million rupiah every month. The results are good because the business they are developing is still relatively new with very limited resources.

08. Gold Standard Carbon Certification



IDBP has been registered as a Voluntary Gold Standard Program of Activities in 2013. Gold Standard is a wellrespected international carbon standard registration and verification agency that has a reputation for facilitating a carbon finance system for voluntary emission reduction and the sustainability of projects in developing countries. While GS Program of Activities (PoA) is designed for different activities in the biogas sector, IDBP focuses on the use of biogas for cooking as a renewable energy project for replacing wood and LPG. Based on the Monitoring Reports period 8 of VPA1 and period 3 of VPA 2 Indonesia Domestic Biogas Program which have been approved by Gold Standard, annual emission reduction from 1 bio-digester unit is 2.56 tCO2e.

Verification means a project and its design have been assessed by an independent third party. Registration means the project has been registered in a database or as a certified standard, like Gold Standard (see https:// registry.goldstandard.org/projects/details/1619). Obtaining carbon credits is made possible under strict standards and regulations, including the obligatory of annual monitoring of the project, emission audits and Kitchen Performance Test surveys. Hivos routinely undertakes these obligations making use of external agencies. In 2020 the verification was conducted by Tuv Nord, one of the agencies accredited by CDM and Gold Standard.

Since the start of the registration in 2013 Hivos has received EUR 1,925,000 of carbon credits (in 2020 the amount was EUR 310,816). The funds are pumped back into biogas activities and form an important part of the co-financing provided for the EnDev funds to implement the BIRU program. The majority of the funds is used to provide investment incentives to the farmers, while a minor part is used for the carbon sales activities, for monitoring, audits, consulting and various surveys (such as Biogas User Survey and Kitchen Performance Tests) and for various project costs that are not covered by EnDev or other donors.

09. Challenges, Mitigation Measures & Lesson Learned

9.1. Challenges and Mitigation Measures

 Inactive CPOs affects labor unavailability for biogas construction in some areas. It hinders the acceleration of the biogas sector development.

Mitigation: IDBP team worked with active CPOs to conduct on the job training in areas where there is no CPO. The training involved a mason group or new CPOs. This mitigation action turned out to be a more effective and efficient approach.

2. Limited understanding of MFIs / Financial Institutions regarding the potential business of biogas technology.

Mitigation: IDBP team conducted webinars pertaining biogas complemented by promotion strategy to the potential LPOs.

3. The fixed dome biogas price is constantly increasing caused by the annual inflation rate. Hence, it affects the increasing material and labour cost. Due to the relatively low purchasing power of the potential users, the higher price would result in the lesser access to biogas installation. Moreover, in the areas with no local biogas mason, when the installation occurs the biogas mason is imported from other areas which increases the price even more.

Mitigation: The IDBP team and CPOs had replaced some of biogas appliances installation with more affordable ones without reducing the quality and still comply with the procedure and regulation stated in the SNI. 7826.2012 as the concrete fixed dome biogas reference for reducing cost. This activity had reduced around 25% – 30% of the previous biogas price.

4. Low construction rate makes mason groups shift their livelihood strategy from biogas construction to other sectors. Consequently, these mason groups will not be available when there are constructions needed in the area. Mitigation: The IDBP team requested other CPOs to deploy their mason groups for biogas construction if there are no available mason groups within the area and/or conduct the job training for new CPOs.

 The significant distance between the field and biodigester hinders the users from utilizing bio-slurry for fertilizer.

Mitigation: The IDBP team created a more intensive campaign on bio-slurry utilization and its benefits (cost reduction on chemical fertilizers, potential business models, soil rejuvenation).

 CPOs' dependency on Special Allocation Fund (DAK) and Local Government Budget (APBD) which is hindered by the reallocation of APBD to COVID 19 measures.

Mitigation: Role of the Government of Indonesia in accelerating biogas sector development in Indonesia is needed. The IDBP team has conducted advocacy and meetings with local governments for possible policies that prioritize biogas development through their legal and financial instruments.

 Survey conducted by a third party shows that fullgrant from government grants does not necessarily translate into a sustainable biogas sector due to lack of users' sense of ownership.

Mitigation: IDBP team together with CPOs, LPOs, and local government will identify potential users based on their needs, users minimum contribution, diversification of funding and increasing financing to Cooperatives to ensure a sense of ownership and biogas performance.

9.2. Lessons Learned

Technology

In 2019, YRE launched a new smaller bio-digester made from polyethylene (PE) known as BioMiRu (Biogas Mini Rumahan). In the beginning, BioMiRu 46

Challenges, Mitigation Measures & Lesson Learned

aims to accommodate farmers who own less than 2 (two) cattles within a more affordable price for the farmers. Along the way, considering that the movement of waste management has been gaining traction by the public, the Central Government, Local Government and communities, the initial objective of BioMiRu is further expanded to include organic waste in general. This means that BioMiRu target market and user profiles also reach out to urban households and businesses that produce kitchen wastes.

By December 2020, there are more than 40 units of BioMiRu installed across ENDEV 5 (five) provinces, West Java and Jakarta with mixed results from technical issues and market acceptance. From a technical standpoint, despite a series of training given by YRE to more than 20 masons, there were still cases of leakage during installation based on QI's and users' reports in South Sulawesi and East Java. Whereas West Nusa Tenggara is thriving with its BioMiRu units with hardly any complaints reported to YRE. Based on YRE's observation, the quality of the BioMiRu heavily depends on the skills and capability of local masons on constructing BioMiRu. As a mitigation effort, YRE provided refreshment training to each of the trained mason on new techniques in BioMiRu installation and sharing sessions from the masons who successfully installed. Due to the Covid-19 pandemic restriction, the training had to be done virtually. There is some progress in BioMiRu installation (i.e. some leakage is reduced) after the virtual training had been conducted by the YRE team. Market acceptance also differs between the provinces where success pilots and supporting local campaigns are shown to be the drivers for BioMiru demand to increase. Market demands from East Java, Central Java, DIY and Jakarta are lower because potential users are driven by the need for longer cooking hours. Hence a fixed dome model is very much preferred in these provinces. Furthermore, these provinces do not have an aggressive waste management campaign and program like in West Nusa Tenggara. Learning from the market testing phase, the marketing strategy for BioMiRu is emphasized on waste management solution instead of emphasizing on gas for cooking.

Despite the mixed results from BioMiRu, IDBP is fully aware that technology innovation has to be improved constantly emphasizing on the inputs from the users, potential users and CPOs. Comparison with biogas technology in other countries is also carried out by the IDBP technical team taking into account the cost, business model and user profile. One of the options is to pilot prefabricated biogas models that are made with different materials and design. In late 2020, YRE formed a co-operation with a water tank home industry factory called Ragam Indah Lestari Cemerlang in Jakarta to produce 25 prefabricated BioMiRu as pilots. The BioMirus are made from PE and fiberglass which purpose is to compare the efficiency and durability of these two variant materials. The prefabricated product is expected to resolve the leakage issue that had occurred during installation of the 2019 BioMiRu version as quality control will be standardized by the manufacturer with minimal dependency of the skill of local masons.

Policy Advocacy Work

As mentioned in the previous section, the purpose of advocacy work by IDBP is to tackle the gap in the biogas value chain. These gaps are identified in multiple sectors namely environmental sector for waste management, agriculture sector for fertilizer market and SME sector for support system for biogas loans and bio-slurry businesses. Having multisectoral gaps requires continuous coordination with multi sectoral ministries, which are challenging to coordinate and to advocate. Thus, IDBP has relied on Bioenergy Directorate of MEMR as the leading sector to host FGDs with the strategic Ministries/Agencies. MEMR has been pivotal in raising the issue for each of the sectors and helped bridge IDBP to open communication with each of the Ministries/Agencies in what policies that are expected to be issued by the Ministries/Agencies. It is vital to map the interest and KPIs of the Ministries with what IDBP can offer razor sharp solutions especially to the Ministry that has never been engaged before. As an example: MoEF is a Ministry that has limited engagement with IDBP whereas from biogas value chain, its authority in waste management sets out the standard for all Ministries/Agencies and Local Governments to comply. Thus, IDBP's environmental study results are used to influence the MoEF and Local Governments on the opportunity loss of untreated waste, hence a mandatory policy on waste management of which is biogas will be needed.

Besides aiming for the issuance of policies that are critical to increase the demand of biogas, advocacy work is also carried out ambitiously to leverage the campaign engine and outreach power of the Ministries/Agencies and Local Governments across Indonesia. The campaign and outreach on biogas are disseminated through the Ministries/Agencies' social media, journalist networks and to the Ministries/ Agencies local facilitators.

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Market Development

During 2020, IDBP took an important step by conducting a Market Feasibility Study the result of which changed the way IDBP formed its strategy. The objective of the study is to challenge the assumptions and projections that were applied in the 2013 study by SNV and to compare current policy landscape, technology innovations and global best practices. The study shows that the previous assumptions would need to be adjusted, namely on the increased price of fixed dome models, digitalization and business models. IDBP then followed up on the recommendations provided in the study to make it competitive 2ith subsidized LPG which includes piloting a portable biogas, use of remote sensors, advocacy strategy and building a network with established biogas business players in other countries.

Based on IDBP's observation, the priority for pushing for an increase demands of biogas lies in the technology and also the financial models. The design and cost structure have to be as efficient as possible if possible with enhanced functions. Furthermore, IDBP would have to adjust itself with the massive application of digital technology to be efficient in resource mobilization especially with regard to monitoring activities of the installed biogas. Hence the piloting of 50 units of remote sensors. Despite the additional cost of the sensors, if applied at scale, the sensor itself will be very helpful not only for IDBP but also for CPOs and LPOs in providing after sales service to the user and for carbon monitoring as well.

The second important lessons learned in BIRU market expansion is the sales and marketing strategy and content of BIRU and bio-slurry. Based on IDBP's observation, sales and marketing content of each of the Provinces. How potential users' acceptance in West Nusa Tenggara and South Sulawesi are different from Provinces in Java). The potential users in Java are motivated by the gas produced and cooking time rather than the bio-slurry. Potential users in West Nusa Tenggara and South Sulawesi are attracted to the bioslurry rather than the gas for cooking itself because the high demand of bio-slurry and scarcity of fertilizer. Having observed this, IDBP shifts its narrative from biogas as alternative energy for cooking to highlighting the economic value of biogas's byproducts which selling biogas as fertilizer producer. This narrative resonates more to potential users with a straight forward value proposition that appeals to potential users. The bottom line is that marketing biogas is the same like marketing any other products whereas the sales and marketing content has to be direct and less complex for potential users.

Capacity Development

During 2020, capacity development efforts to YRE and CPOs are intensively increased to prepare YRE and the CPOs to lead the biogas sector development post ENDEV support. The capacity development plan for YRE is based on the self-assessment by YRE as an organization and as BIRU program implementer which includes fundraising capacity for BIRU program, policy advocacy work, data analytics, knowledge management, planning a campaign and UX (user experience). As an example: YRE has been testing its fundraising channel for biogas through retail proposals which have contributed to new biodigesters built within and outside ENDEV priority areas. It is important to directly test all of the training materials given to YRE into real implementation. The results of the testing were quickly analyzed to modify the activities to be more effective. This process of being agile is also contributed by the UX training that was conducted.

Capacity development of CPOs was not limited only for CPOs under the BSC incubation component. The capacity of other CPOs was developed by YRE whilst implementing a project. Basic issues such as CPOs administrative compliance was also imposed by YRE to train CPO to be ready when funding opportunity comes directly to CPO. This paradigm shift of the CPOs depending on YRE has been slowly shifted to the independency of the CPOs to look for funding, administrative compliance and reporting. Based on YRE's experience, it is important to give a long term vision for the CPOs to boost the motivation for the long run.

10. Way Forward

Technical capacity

In terms of team management, it would be better if there was an R&D team within YRE that focused on product innovation, finding what works at community level, technological wise. Although the IDBP biodigester has a proven track record and is based on the GGC 2047, various design optimizations could lead to cost reductions. Innovations on practicality i.e. moveability and IoT utilization could possibly increase demand and reduce operation and management cost in the future.

Therefore, starting in 2019, the YRE team has conducted research on how to redesign a bio-digester which will be more affordable and easier to install. In mid of 2019, the first new smaller biogas had been installed by the YRE team in Depok city, which is near Jakarta city. Depok city had been chosen for the first piloting due to the urban community consideration, and it also there is no cattle availability.

The technology had adapted to the previous fixed concrete dome design, but the difference is only for a digester part that is made from polyethylene (PE) material which is easy to find in any materials shops in Indonesia. Besides the materials availability, fast installation which is no longer than 3 days to install, the PE model can be easily installed by ordinary people who received a short biogas PE training (it does not need a trained mason to install).

In the end of 2019 and early 2020, YRE collaborated with BSN (Indonesia Standardization Agency) and started to develop the National Indonesia Standard (SNI) of low-pressure PE - biogas installation procedure. This procedure becomes the minimum standard which has to be required for any personal or group to install PE - biogas.

The content of low – pressure PE – Biogas SNI is different from other previous biogas SNI that regulates biogas installation which is made from concrete and fiberglass materials. Thus, it needs at least one year long to develop the SNI in 2020 due to some of desk and field researched that had to conducted by the BSN team to verify the existence and performing of a PE digester that had been installed by YRE team in several areas, and also to collect some inputs from many stakeholders (i.e. Governments, academic, practitioners, biogas users, etc.).

At the same time in 2020, YRE also had collaborated with one of home industry factory named Ragam Indah Lestari Cemerlang to produce prefabricated BioMiRu and installing prefabricated 25 PE and fiberglass biodigesters as piloting in 5 provinces in Indonesia.

Innovations might include creating a thriving bioslurry sector that would create bio-digester demand, although the development of a commercial bio-slurry sector is definitely challenging as it requires close collaboration with multiple farmers or even CPOs to bring the activities to a real business level.

CPOs readiness to be the key driver of scaling up BIRU

In terms of project timeline, the incubation of CPOs to make them prepared and ready for post-EnDev support should be done earlier. It would take a longer period of time to create CPOs' resiliency in product innovation, networking, financial, and organizational management. The fact that not all CPOs had proper financial and organizational systems even strong business models showed a weak point and a late response to create a biogas market through CPOs as spearhead of IDBP.

The narrative should always be adaptive and agile enough to fit into current development

On the other hand, the IDBP business model must be reviewed over time to be able to adapt to the continuous changes of regulatory framework, market demand, materials supply, inflation, subsidy policies on LPG, financial support readiness from other partners, and other related aspects of IDBP implementation. As assumptions and policy landscape are constantly changing, the Program's narrative should also be adaptive to rising issues. In the BIRU program, the narrative shared to the public should not only be limited to giving households access to clean energy but shifted to a circular economy. In this way, cross

sectoral stakeholders can easily identify and resonate with their own interest.

As an example: cross-cutting issues such as the deforestation in the forestry sector is also an opportunity for biogas to be offered as a solution as BPS's 2018 data shows that there are 10.734 villages in Indonesia that still cook using firewood retrieved from the Forest Area. However, YRE as the IDBP implementer together with MEMR have developed a project proposal to BPDLH that includes a deforestation issue to not only strengthen the biogas business case but also provide a room to offer bio-slurry as one of the solutions for soil conditioner in degraded land.

Develop incentive scheme options that answers the needs of the users

In terms of incentive schemes, there is a need to harmonize the incentive to give biogas a level playing field in the sector. It was suggested that other government budgets may also be targeted for re-allocation to the bio-digester sector. IDBP could introduce MoUs with provinces to set-up a marketbased approach illustrating the benefits of the IDBP approach in terms of sustainability. Advocating for incentives for all bio-digester actors (preferably in- and outside IDBP), provided the technology of all these actors is approved and as long as they follow certain standards (i.e. IDBP approach on warrantee and after-sales services). The incentives should be offered in options and should not be limited to financial incentives such as subsidy. Other things such as technical assistance, offtaker guarantee for bioslurry and other non-cash support may be offered to interested potential users.

Flexibility in adopting technological advancement, digital innovations and best practices

On the other hand, it is also important to match IDBP with international industry trends related to the financing scheme of IDBP e.g. PayGo system. A clear private sector development strategy (PSD) is required to support this. The PSD would provide differentiated support to poor, medium and well performing CPO's. Well-performing CPOs could graduate towards taking up more responsibilities such as QC, client data collection etc in exchange for an agreed incentive.

Furthermore, collaboration such as joint ventures with biogas industry players in Indonesia or potential biogas businesses who wish to enter Indonesia are needed if market conditions were to improve far enough for investment. IDBP is a national program and should create an enabling environment for those companies to enter Indonesia. For example, by assisting them in identifying areas with bio-digester potential but also letting these companies benefit from the national carbon program or incentive regime.

Annex

Annex 1: IDBP Office Addresses

	BIRU OFFICE					
No	Province	Address	Contacts			
1	Jakarta	Jl. Pejaten Barat No. 30 A Jakarta 12550	Ph. : +62 21 7821090, +62 21 7821086 Fax : +62 21 7804443			
2	Central Java	Jl. Diponegoro no 17 RT 005 RW 009 Karang Anom Klaten Utara 57437, Jawa Tengah	Ph. / Fax : +62272-325968			
3	East Java	Jl. Klampok Kasri 2F No. 39 Malang 65115	-			
4	West Nusa Tenggara & Bali	Graha Permata Kota Blok CA No. 72 Selagalas, Mataram, Nusa Tenggara Barat	-			
5	South Sulawesi	Jl. Todopuli Raya Timur Kompleks Villa Surya Mas Blok E/03 Kel. Borong Kec. Manggala Kota Makassar - SULAWESI SELATAN	Ph. / Fax : +62 411 831044			

Annex 2: Promotion Activities

Biogas Talkshow in Dhoho TV, East Java

Radio Talkshow in East Java

 \checkmark

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Peluang Usaha Biogas dalam Membuka Lapangan Pekerjaan dan Peningkatan Ekonomi Keluarga

INSTAGRAM LIVE WITH INFLUENCER

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