ANNUAL REPORT 2022

BIRU biogas rumah

INDONESIA DOMESTIC BIOGAS PROGRAM

Yayasan Rumah Energi

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Abbreviations

ASS	After Sales Service
Bappeda	*Badan Perencanaan Pembangunan Daerah* (Local Planning and Development Agency)
BIRU	Biogas *Rumah* (Domestic Biogas)
BUS	Biogas User Survey
CME	Coordinating/Managing Entity
CPO	Construction Partner Organization
CSR	Corporate Social Responsibility
CU	Credit Union
DGNREEC	Directorate General of New, Renewable Energy and Energy Conservation
DPMPD	*Dinas Pemberdayaan Masyarakat, Pemerintahan Desa, Kependudukan dan Catatan Sipil* (Department of Community Empowerment and Village Government and Population)
FCF	Fair Climate Fund
FGD	Focus Group Discussion
HBC	HIVOS Biogas Consortium
HIVOS	Humanist Institute for Cooperation with Developing Countries
IDBP	Indonesia Domestic Biogas Program
IDR	Indonesian Rupiah
LPG	Liquefied Petroleum Gas
LPDB	*Lembaga Pengelolaan Dana Bergulir* (Revolving Fund Management Institute)
MEMR	Ministry of Energy and Mineral Resources
MFI	Micro Finance Institutions
MOEF	Ministy of Environment and Forestry
PE	Polyethylene
RBF	Rabobank Foundation
RPJMD	*Rencana Pembangunan Daerah Jangka Menengah-Daerah*
SDG	Sustainable Development Goal
SSBC	South-South Biogas Community
VPA	Voluntary Project Activity
YRE	*Yayasan Rumah Energi* (Rumah Energi Foundation)
YSEALI	Young Southeast Asian Leaders Initiative

Number of Digester in Years

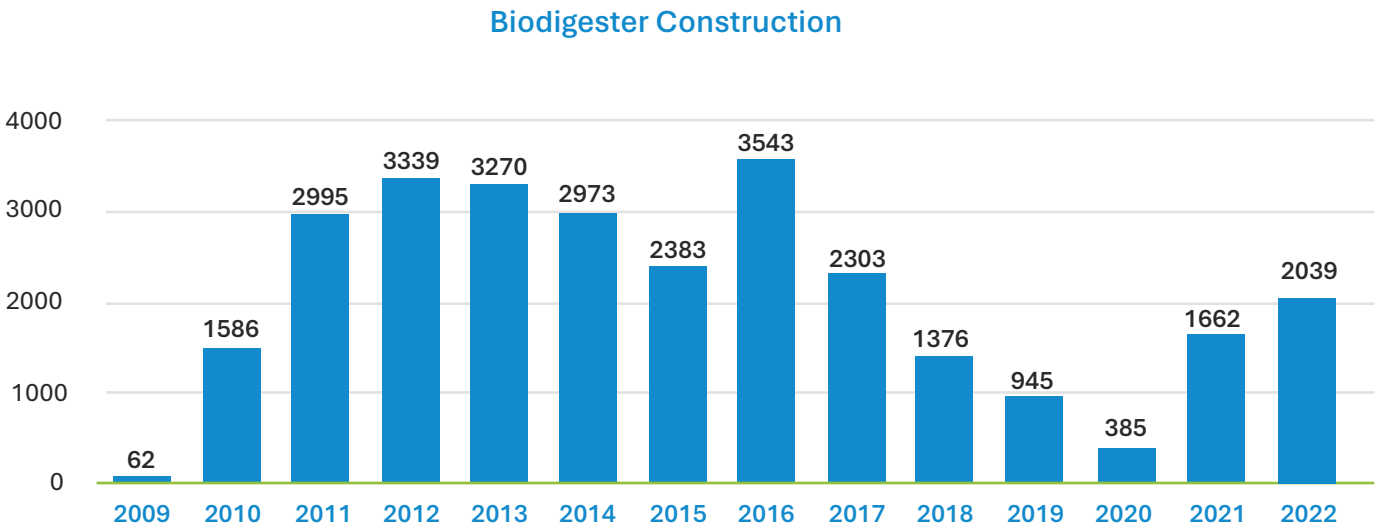

Figure 1. Biodigester Construction 2009 – 2022

Number of People with Access to Clean Cooking Energy

133,459 people have gained access to clean energy for cooking resulting from the construction of 28,861 units of digesters. In 2022 alone, 7,212 people have gained access to clean energy for cooking from 2,039 units of digesters.

Number of Digester per Provinces

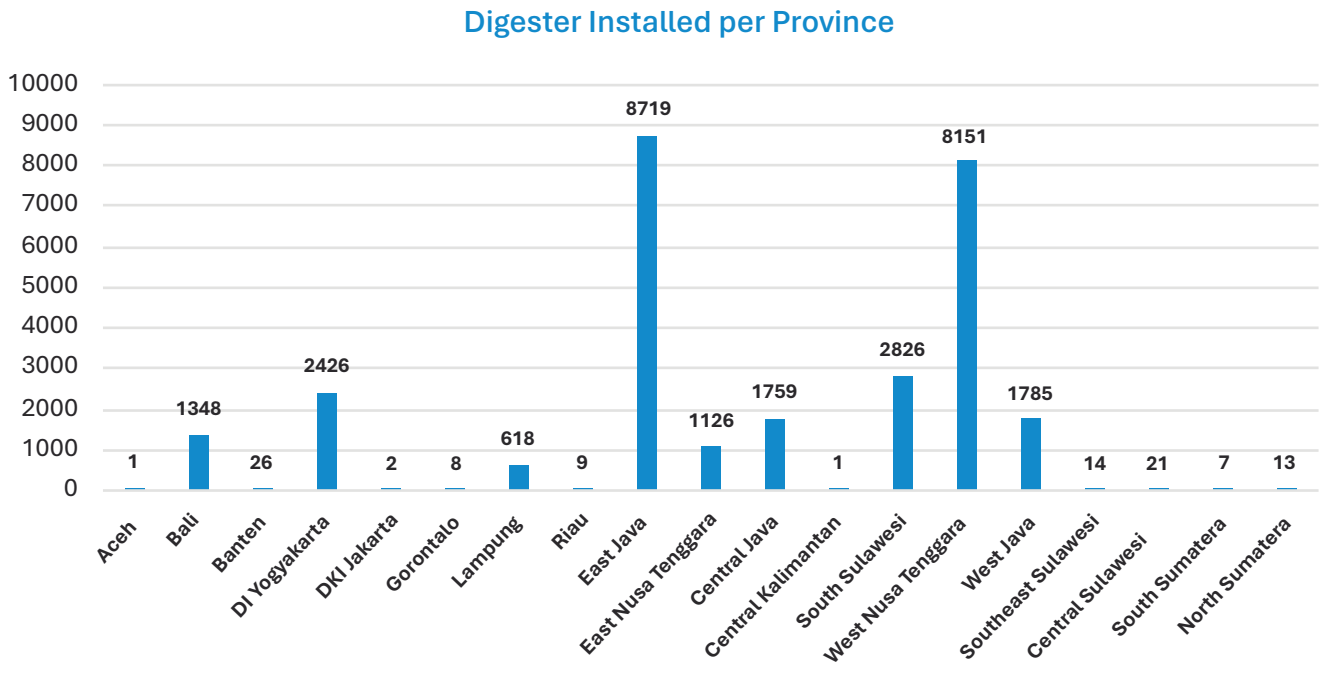

Figure 2. Total Biodigester Installed per Province

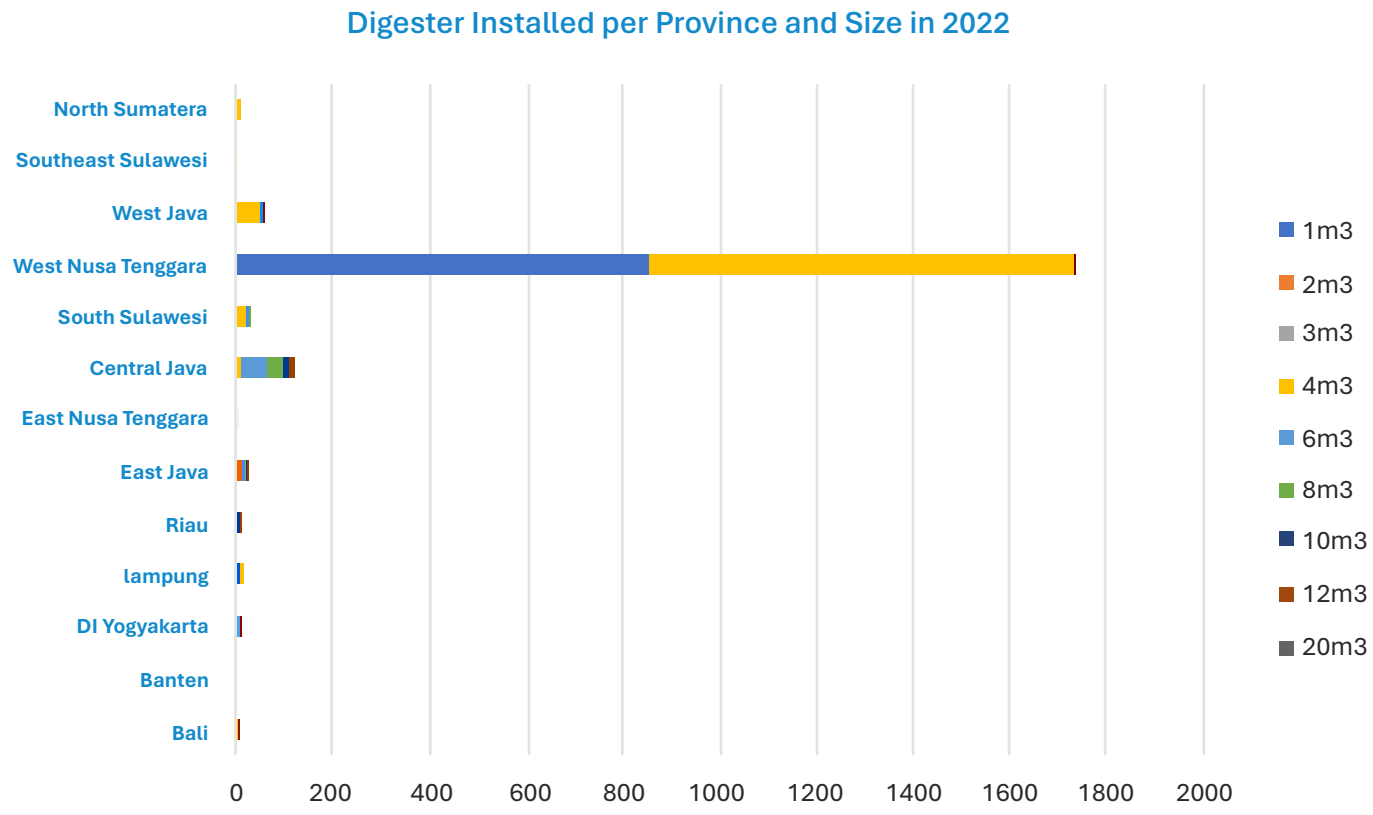

Figure 3. Biodigester Installed per Province in 2022

There are 13 provinces that built biodigesters in 2022. The province that is aggressively develop biogas in 2022 is West Nusa Tenggara with a total number of 1,737 biodigester units built, of which 50.66% were 4 m3 (yellow bar in chart) and 49.22% were 1 m3 (blue bar in chart). This happened because YRE coordinated with the West Nusa Tenggara's Bappeda and the DPMPD to synergize province's priority programs according to the roadmap for the use of renewable energy to be developed in the downstream sector so that village communities can access clean and environmentally friendly energy in a sustainable manner.

Number of Digester per Size

Table 1. Total Biodigester Installed per Province and Size

Province	2009 to 2021	2022	Volume Biodigester									Total
			1 m3	2 m3	3 m3	4 m3	6 m3	8 m3	10 m3	12 m3	20 m3	
Aceh	1	0	0	0	0	0	0	0	0	0	0	1
North Sumatera	0	13	0	0	0	13	0	0	0	0	0	13
Riau	0	9	0	0	0	0	4	1	3	1	0	9
South Sumatera	7	0	0	0	0	0	4	1	0	0	0	7
Lampung	601	18	10	0	0	8	0	0	0	0	0	619
Banten	25	1	1	0	0	0	0	0	0	0	0	26
DKI Jakarta	2	0	0	0	0	0	0	0	0	0	0	2
West Java	1727	58	0	0	0	52	4	1	0	1	0	1785
Central Java	1639	120	1	0	0	10	54	34	10	11	0	1759
DI Yogyakarta	2415	11	2	3	0	0	3	0	1	2	0	2426
East Java	8690	29	0	14	0	0	7	2	3	3	0	8719
Bali	1338	10	1	0	0	6	0	0	0	3	0	1348
West Nusa Tenggara	6414	1737	855	0	0	880	1	0	0	1	0	8151
East Nusa Tenggara	1124	2	0	0	0	0	1	1	0	0	0	1126
Central Kalimantan	1	0	0	0	0	0	0	0	0	0	0	1
South Sulawesi	2797	2	1	0	1861	0	884	25	9	15	0	2799
Central Sulawesi	21	0	0	0	0	0	0	0	0	0	0	21
Southeast Sulawesi	12	2	0	0	0	2	0	0	0	0	0	14
Gorontalo	8	0	0	0	0	0	0	0	0	0	0	8
Total	**26882**	**2012**	**871**	**17**	**1861**	**971**	**958**	**64**	**26**	**37**	**0**	**28834**

Funding Sources for Digester Installation

In 2022, only three financing schemes occurred, where 88% of biodigester installation were from user investment funds blended with carbon subsidies from YRE. There was a 18% increase in the Co-funding Carbon + User Contribution variable, compared to 70% of the total biodigesters built in 2021. This indicates that the biogas market in Indonesia and the desire of citizens to independently build biodigesters are gradually developing. Following the willingness to add personal funds to potential biogas users in financing schemes with other parties, carbon subsidies with funds from companies (CSR), governments, or universities showed a proportion of 10% from total units installed in 2022.

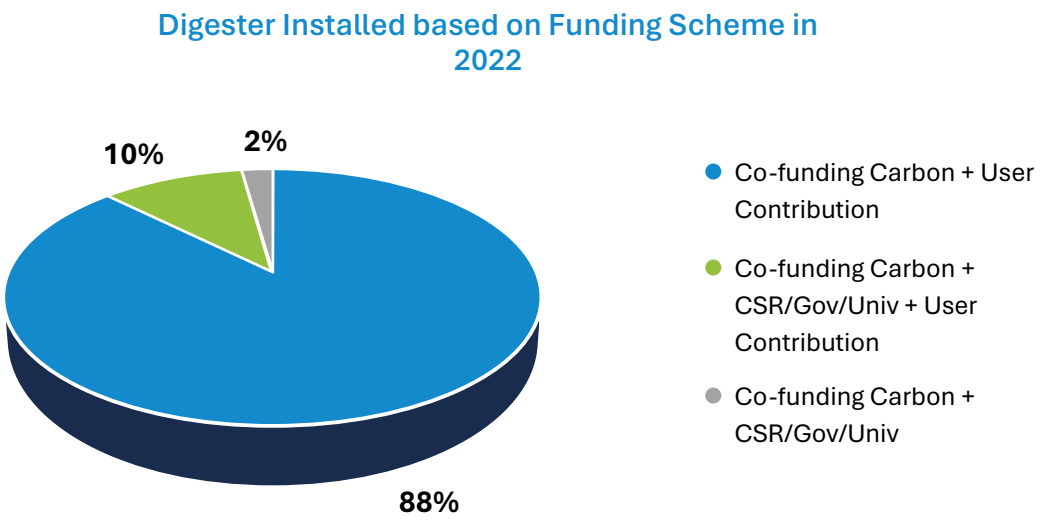

Figure 4. Distribution of Digester Installation based on Funding Scheme in 2022

The following is a bar graph of YRE's biogas construction financing model from 2009 to 2022. It can be seen that the development pattern in 2022 is dominated by Co-funding Carbon + User Contribution in gray. In contrast with the initial implementation of BIRU program in 2009 which mostly were Co-funding Grant model, represented by the orange bar. At the start of the program, many biodigester installations used funds from co-financing grants. During 2010 – 2017, biogas construction reached more than 1500 biodigester units per year. Only a few proportions of the installations that used the 100% Grant financing model, this is due to prioritization of funding for biodigester construction from household users who will use biogas in accordance with building the sense of ownership of the biogas being built.

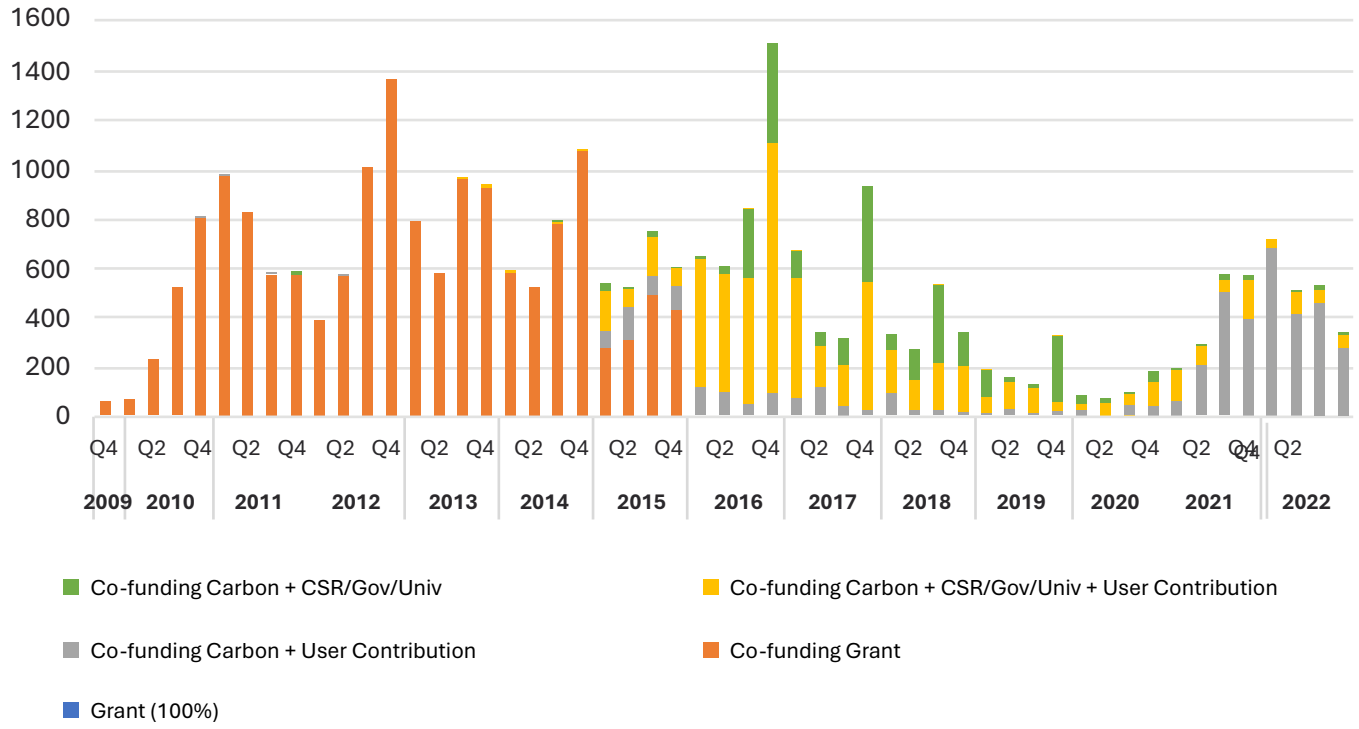

Figure 5. Trend of Digester Installation based on Funding Scheme in 2009 – 2022

Note:

Grant (100%)	is for biodigester installation with whole funds coming from YRE donor/grant funds without subsidies from other parties.
Co-funding Grant	is for biodigester installation with co-financing between grant fund from donors and other funding such as company's CSR, academicians, household/user, carbon subsidy fund (after Gold Standard certification and carbon credit trading), and the government.
Co-funding Carbon + CSR/Gov/Univ + User Contribution	is for biodigester installation with co-financing between YRE carbon subsidy fund, company's CSR, government funds, or academic funds, and household/user fund.
Co-funding Carbon + User Contribution	is for biodigester installation with co-financing scheme between YRE carbon subsidy funds and household/users' fund only.
Co-funding Carbon + CSR/Gov/Univ	is for biodigester installation with co-financing scheme between YRE carbon subsidy funds with company CSR funds, government funds, or academic funds without household/users' fund.

There was a significant decline in 2019 – 2020 due to the Covid-19 pandemic which forced stakeholders to reallocate their budget to handle the outbreak. This challenge caused CPOs, who depend on special allocation funds (DAK), Local Government Budget (APBD), and CSR funds, to be unable to develop biogas in their areas. There has been an increase in development during post-covid in 2021 – 2022, although not as much as 2010 – 2017. The Co-funding Carbon + User Contribution financing model has become a popular model post-covid. This is a sign that there is a desire from the community to make biogas with their own funds. This is also supported by regional government policies to develop clean energy to achieve the renewable energy mix target of the General Regional Energy Plan (RUED). In 2022, there are also FMD among cattle that lower interest in constructing a biodigester.

Quality Inspection and After Sales Service

Table 2. Quality Inspection and Aer Sales Service 2009 – 2022

Year	Number of digester built in year	Total of Digester in year	Total of Digester Quality Check	Completed ASS1	Completed AS2	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	1,588	20,684
2018	1,370	23,821	22,363	1,167	775	21,851
2019	946	24,767	22,775	652	315	22,503
2020	390	25,157	23,043	208	3	22,711
2021	1,661	26,818	23,774	565	0	23,276
2022	**2,039**	**28,861**	**24,912**	**1001**	**214**	**24,491**

Job Creation

The biogas sector has considerable contribution in the absorption of labor. In 2022, a total of 2,039 biogas digesters have been built and there are 102 jobs created from the biogas supply chain, including construction of bio-biodigester 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.

January

- Biogas User Survey 2021
- Collaboration through CSR with Tokopedia in Central Java and Yogyakarta
- Collaboration through CSR with Pertamina IT Panjang in Central Lampung

February

- IDBP Coordinating/Managing Entity (CME) was transferred from HIVOS to YRE

March

- Carbon credits delivery agreement for 2022 – 2025 with FairClimateFund was signed
- IDBP registered to National Registry System (SRN) for climate change mitigation actions based on Presidential Regulation 98/2021 regarding Carbon Economic Value
- Participated in Biogas FGD Field Visit in South Africa from Greencape Capital, facilitated by Resilience Development Initiative

April

- Held annual CPO Gathering
- Collaboration through CSR with Greeneration Foundation in Banyuwangi
- Collaboration through CSR with Great Giant Pineapple in Lampung

May

- YRE spin-off company for bioslurry offtaking namely PT Pupuk Suburkan Negeri (PSN) was established
- Unlocked new area in Riau through CSR collaboration with PT Pertamina Hulu Rokan

June

- Held online FGD regarding Foot and Mouth Disease (FMD) for CPO's educational purposes
- Intensive coordination with YRE's cooperatives partner for PSN's bioslurry supply
- Audience with Department of Agriculture and Food Security of East Java

July

- 41 Smart biogas remote sensors were installed in East Java and West Nusa Tenggara
- Hosted YSEALI fellowship program for 4 fellows from Southeast Asia

August

- South-south Biogas Community (SSBC) was launched
- Participated in giving priority issues recommendation for Energy Transition Working Group (ET WG) G20

September

- Workshop collaboration with Sebumi
- Collaboration through CSR with Credit Union (CU) Bahenma in North Sumatera
- FMD medical and biosecurity tools aid distribution for 3 cooperatives partners in East Java

October

- Handed over 30 units of biogas installed through Swakelola Program in Semarang to Local Government (Vice Governor and Head of the Department of Energy and Mineral Resources of Central Java

November

- 70,308 tCO2e of carbon credits vintage 2021 was issued

December

- SNI 9107:2022 regarding biodigester with polyethylene materials was launched based on National Standardization Agency Decree Number 634/KEP/BSN/12/2022
- A total of 28,861 biodigester units were installed until 2022 with 2,039 units among it were installed in 2022 alone

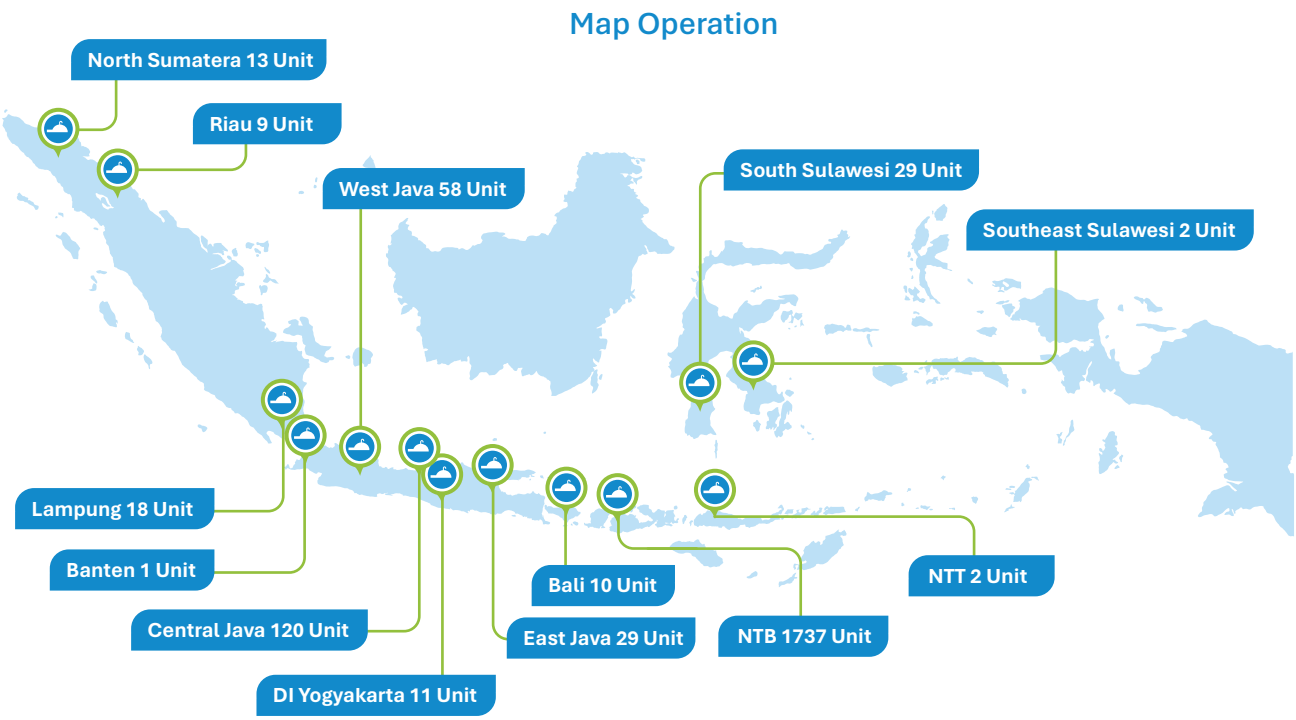

Figure 6. IDBP Operation Map in 2022

In 2022, 2,039 biodigester units were built in 13 provinces with the addition of two new provinces i.e. Riau and North Sumatera. The expansion to these two new provinces was initiated from collaboration with third parties through their CSR program and is expected to be a trigger for more biodigester construction in the respective area. Construction within these provinces in 2022 was part of a successful collaboration with 22 construction partners who have been encouraged to develop the biogas market in their area independently. In terms of program development in other provinces, with support provided by the private companies, YRE did not only o¬ffer the biogas installations, but also training and development for CPOs and biogas local masons in the new provinces. It was expected that they will contribute to the biogas market development.

Carbon Monitoring, Reporting, and Verification (MRV)

IDBP feasibility study in 2008 mentioned that carbon finance is identified as an additional source of finance that makes the program more financially attractive. In 2013, IDBP was registered as a voluntary Gold Standard Program of Activities with focus on the use of biogas for cooking as a renewable energy project for replacing wood and LPG (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. Since 2013 YRE had been involved in the development, monitoring, evaluation assisting HIVOS, as the prior CME of IDBP, with annual Biogas User Survey (BUS).

In 2021, carbon monitoring activities including the management of its credits had been transferred from HIVOS, as the prior CME of IDBP, to YRE. Since then YRE has been responsible for all the MRV activities as well as IDBP carbon credits management. The carbon funds generated are intended to support biogas activities. 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 donors.

Monitoring cycle usually started with Biogas User Survey (BUS) activity in December - January done by a research consultant. Then the Carbon consultant compose IDBP Monitoring Report that will submit to the Gold Standard based on the BUS result. Before submitting to Gold Standard, the verification for Monitoring Report vintage 2021 was conducted by AENOR International, one of the VVB agencies accredited by Gold Standard. Due to COVID-19 pandemic restriction, AENOR did a remote audit to verify IDBP.

After series of audit, technical review and verification report composing by VVB, YRE submitted the Monitoring Report and all required documents to Gold Standard for rounds of Performance Review in the SustainCERT platform. After two rounds of Performance Review, in November 2022, emission reduction for IDBP vintage 2021 credits was issued by Gold Standard with total number of 68,902 VERs, and average of annual emission reduction from one unit of installed biodigester unit is 3.1 tCO2e based on IDBP Monitoring Reports for period 9 of VPA1 and period 4 of VPA2 which have been approved by Gold Standard.

Establishment of PT Pupuk Suburkan Negeri

As scaling-up efforts of IDBP installed number of biodigesters, in 2022 YRE established an organic fertilizer (bioslurry) company named PT Pupuk Suburkan Negeri (PSN). PSN main business is to be the offtaker of bioslurry that are produced by YRE's installed biodigesters to then be sold to institutional buyers such as plantation companies and mining companies for soil restoration.

Prior to its establishment in March 2022, YRE approached four cooperatives in East Java, namely KUD Tani Wilis, KUD Sumber Makmur, KAN Jabung and KPSP Setia Kawan to discuss YRE's plan to become a bio-slurry offtaker in October 2021. This was welcomed by them even though from the four cooperatives only KUD Sumber Makmur has started the bio-slurry business. Furthermore as the follow up of the meetings, the four cooperatives started calculating the prices and procedures for collecting bio-slurry from biogas users who are the members of the cooperative while YRE prepared registration of companies that will carry out the business.

In the same year, YRE was awarded as one of WE4F S/SEA's innovators in which the fund was then channelled to PSN for piloting 111 demoplots for food-crops in East Java. The results from the demoplots were an average increase of production of 20%. Throughout the project to date, one of the lessons learned is that interests and demands came from institutional buyers such plantation companies and mining companies. The latter needed significant supply of bioslurry for post mining reclamation. Through bioslurry offtaking activities by PSN, number of new biodigester installations is hoped to gain increased and the sustainability of biodigester utilization amongst users is stimulated and assured.

IDBP CME Transfer from HIVOS to YRE

Until February 2022, HIVOS was the initial CME of IDBP with YRE as the Indonesian NGO responsible for local implementation of the program. HIVOS is a Dutch NGO who developed biogas program that covers multiple countries among which are Indonesia, Cambodia, Kenya, Uganda and Tanzania.

Its main strategy is to develop the supply and demand side of the market, provide supporting services such as training and credit provision, and create a supporting institutional environment for the use and promotion of biogas. Together with the local biogas partners, HIVOS had set up Gold Standard registered carbon credit programmes to provide long-term financial support.

In 2021, HIVOS adopted a new strategic direction of the organization which resulting in phasing out number of programs that then be handed over to national entities in the Global South, including Indonesia Domestic Biogas Program (IDBP). This is also an effort for institutional development of their local partners. Therefore, there was gradual transfer of responsibility from HIVOS to YRE to sustainably run the program. HIVOS also ended its role of Coordinating/Managing Entity (CME) of IDBP PoA and transfer it to YRE, aligning with the local ownership policy pointed out in HIVOS' Strategic Compass 2021 – 2024. The transfer process began with the signing of an MoU between HIVOS and YRE in February 2021 regarding the transition of IDBP Carbon Funds Mechanism. Followed by the registration of YRE's account in the Gold Standard Impact Registry and Sustain-CERT Platform in January 2022. It was in February 2022 when the CME role of IDBP officially transferred to YRE.

To provide support in selling biogas carbon credits to the international market, HIVOS transferred all its responsibilities of the programmes to the HBC and FCF. FairClimateFund (FCF) is a social venture 100% owned by Cordaid and based in the Netherlands with the mission to demonstrate that the carbon markets should benefit those people who are the most vulnerable to the impacts of climate change worldwide. FCF implements and trades credits from high quality carbon projects of its partners to international buyers, both end users and resellers. FCF will take the role of Focal Point, providing technical assistance (TA) and acting as a carbon broker for the international carbon market. The HBC (HIVOS Biogas Consortium) will take care of all remaining responsibilities.

Efforts in Compliance to Presidential Regulation 98/2021 Regarding Carbon Economic Value

In October 2021, Indonesia launched Presidential Regulation 98/2021 regarding Carbon Economic Value. The regulation obliges all climate change mitigation actions to be registered under National Registry System (SRN) by the Ministry of Environment and Forestry (MoEF). Since March 2022 YRE have done the registration process of IDBP into SRN and must pass these 4 steps to have the program listed as climate change mitigation in SRN :

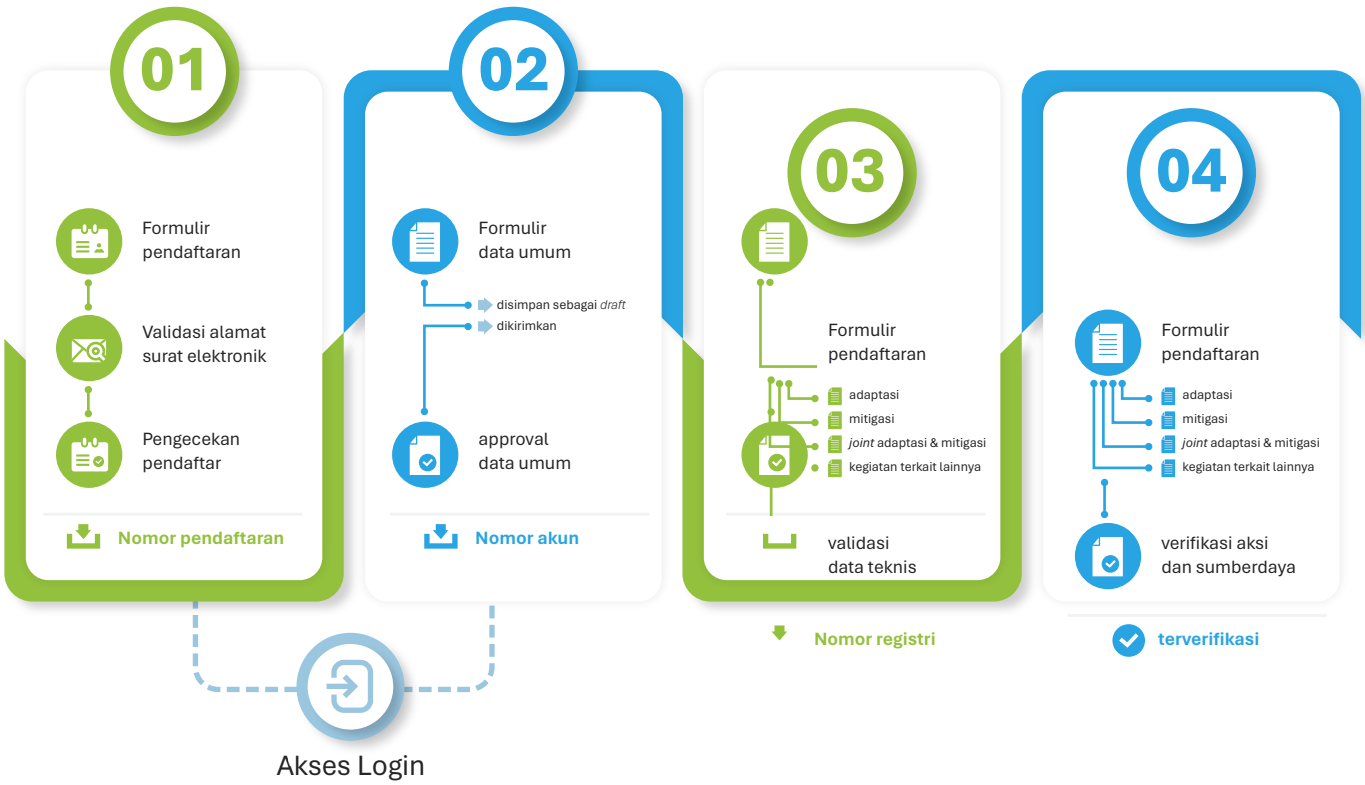

Figure 7. Registration Process of Climate Change Mitigation Actions to National Registry System (SRN)

Below is the steps that have been carried out by YRE to register the IDBP :

- Step 1 - March 2022
- Step 2 - Got approval for IDBP in July 2022
- Step 3 :
  - August 2022 - Submit first Project Design Document/DRAM version 1
  - November 2022 - Got feedback from MoEF
  - December 2022 - Submit revision DRAM version 2

On the other hand, the regulation also arranges the quota for offshore carbon trading. Foundations are not allowed anymore to sell carbon credits. For that reason, it is necessary to shift the implementation of the IDBP from YRE as a not-for profit entity to a social business enterprise. The expected role of the company is to ensure that the foundation can execute its mandate of a social organization aimed at improving livelihoods and contribute to a more climate-resilient world through the responsibility for carbon sales, especially the IDBP VERs. In preparation for the IDBP transition plan, YRE intensively carry out legal consultations in May – June 2022 as well as tax and financial consultation during the last quarter of 2022 to have the new business plan and financial plan ready in the start of 2023.

South-South Biogas Community

Each HBC member acts as the new national biogas program developer after duties were handed over from HIVOS. Apart from the carbon management and selling that the HBC members have with FCF, the consortium urged to unite their movement in developing the biogas sector in the global south as well as increasing the biogas and bioslurry production in developing countries. Therefore, YRE along with Kenya Biogas Program (KBP) and Biogas Solutions Uganda Limited (BSUL) set up a consortium namely South-South Biogas Community (SSBC) that focuses on removing the non-technical barriers to contribute in creating better frameworks for the widespread production of biogas and bioslurry, which in line with the respective national targets.

South-South Biogas Consortium currently consists of 3 partners from 3 countries and strives to promote the production of sustainable biogas throughout these countries, especially by exchanging best practices, creating new business models, and increasing investments in biodigester production. The soft launch of SSBC was held on July 14th through a webinar which aims to facilitate knowledge and experience exchange within and beyond the consortium member countries. Themed with "Biogas Program, Technology Innovation and Opportunities for Development", the launching webinar successfully put together 8 speakers from Asia, Africa, and Europe region.

After its launch, SSBC needs to formulate objectives and goals as well as plan strategies to become a global advocacy platform for biogas. It is important to maintain the launching momentum to scale up biogas for energy transition on a global scale.

National Standards for Polyethylene-based Biodigester (SNI 9107:2022)

To enhance the development of biodigesters, YRE attempted to create biogas biodigester tank technology using polyethylene as raw material and named it Mini House Biogas (BioMiru). After successfully producing BioMiru in 2021, YRE submitted a proposal for the creation of Indonesian National Standards (SNI) to the-National Standardization Agency (BSN) in-collaboration with DGNREEC from MEMR Indonesia, biogas experts, and stakeholders involved to formulate the draft of the SNI. YRE also assisted in the national standardization efforts for the production and quality requirements of polyethylene-based biogas biodigester tanks (BioMiru) with SNI 9107:2022 titled Quality Requirements for Biogas Production Units with Polyethylene-Based Digestion Tanks. This standard establishes general specifications, specific specifications, material requirements, and testing methods for biogas biodigester tanks made of polyethylene with a capacity of up to 5 m3. The standard applies to biogas produced from anaerobic fermentation processes using raw materials such as livestock manure (cattle, goats, chickens, pigs) and household organic waste.

In August 2022, all consensus meeting participants agreed that this draft standard (RSNI) was suitable to become an SNI that could be used by the public to develop biogas with construction materials made of polyethylene (PE). On December 30, 2022, the National Standardization Agency issued Decree No. 634/KEP/BSN/12/2022 concerning the Determination of SNI 9107:2022 Quality Requirements for Biogas Production Units with Polyethylene-Based Digestion Tanks

Financing Scheme Distribution among Installations in 2022

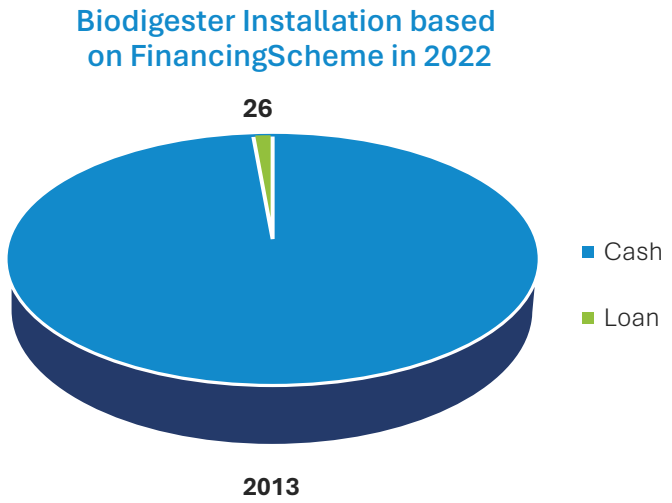

Figure 8. Distribution of Biodigester Installation based on Financing Scheme in 2022

Majority of biodigester built by cash with co-financing or independently from household, government, company, and any other institution. During 2022, there are 26 units biodigester built by loan scheme from 5 provinces: East Java, Lampung, North Sumatera, South Sulawesi and DI Yogyakarta only with total loans disbursed is IDR 211,774,000. The number of loan scheme biodigesters this year has decreased compared to 2021 with a total of 81 biodigester units.

Government Co-funding for Biodigester Installation

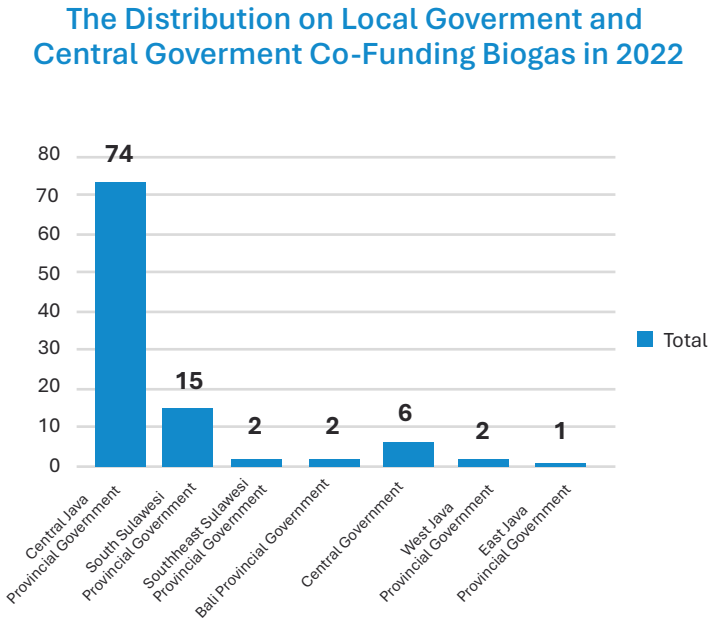

Figure 9. Distribution of Biodigester Installation Co-funded by Government in 2022

The government plays a crucial role in the development of biodigesters by providing co-funding to biogas users. Government funds for biogas development can be channeled through both the central and local governments. In 2022, the central government contributed funds for the construction of six unit of 4 m3 biodigesters through the Ministry of Environment and Forestry (KLHK) in Subang, West Java. Six provincial governments also provided funding for biodigester development in 2022. The Provincial Government of Central Java is the government institution that has invested the most in biogas development compared to other provinces. The funds for the construction of biodigesters in Central Java were distributed by the Energy and Mineral Resources Agency (ESDM) of Central Java Province, the ESDM Branch Office of Central Java Province, Village Funds, and the Environmental Agency of the District.

Company & Institution Co-funding for Biodigester Installation

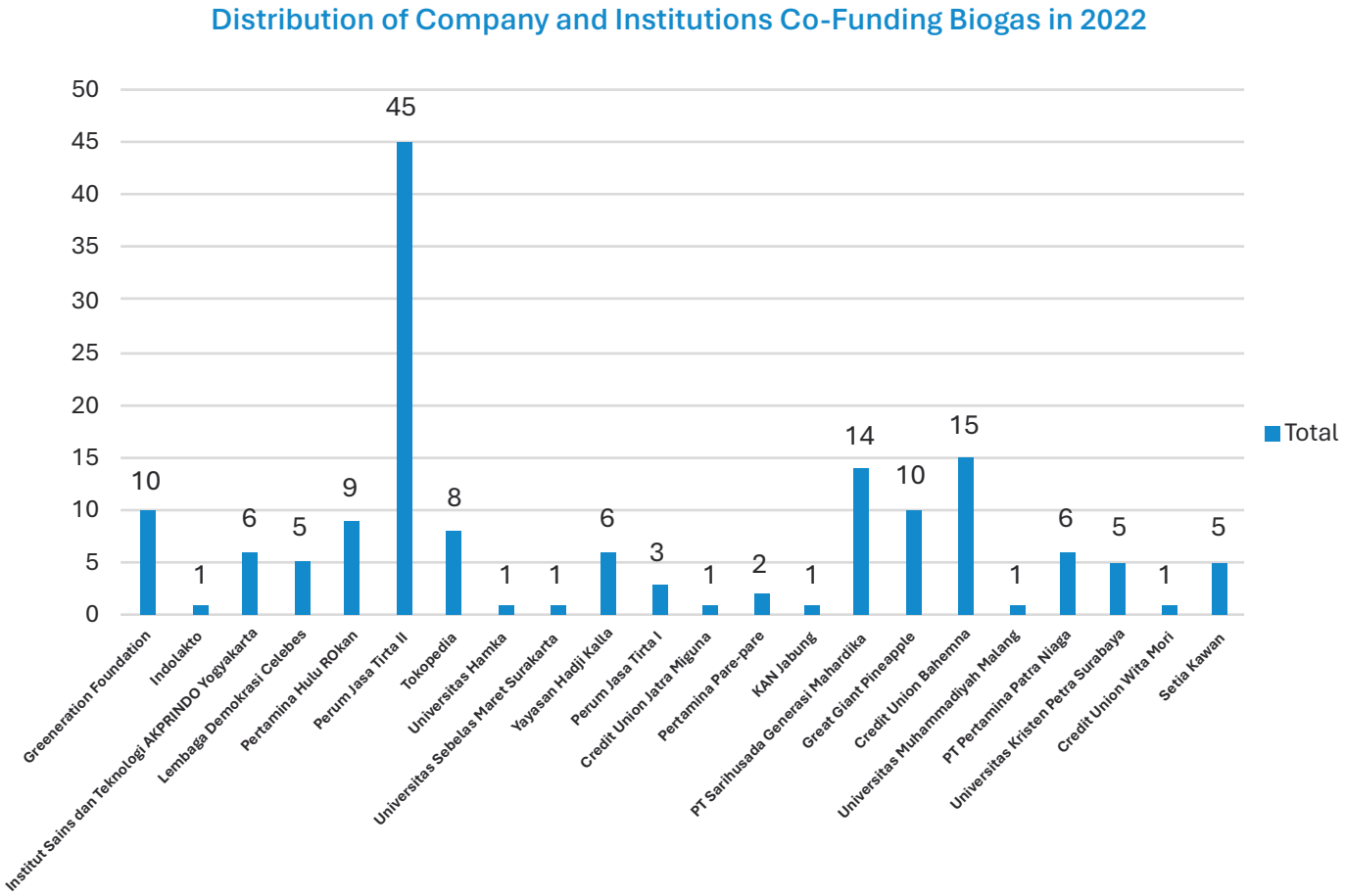

Figure 10. Distribution of Biodigester Installation Co-funded by Company and Institutions in 2022

There is a total of 22 institution consist of companies, cooperatives, and organizations who provided financial support (loan or cash subsidy) for biodigester construction in 2022. Among them were Greeneration Foundation, Indolakto, AKPRIND Yogyakarta, Lembaga Demokrasi Celebes, Pertamina Hulu Rokan, Perum Jasa Tirta II, Tokopedia, Hamka University, Sebelas Maret Surakarta University, Hadji Kalla Foundation, Perum Jasa Tirta I, Credit Union Jatra Miguna, Pertamina Pare-pare, KAN Jabung, PT Sarihusada Generasi Mahardika, Great Giant Pineapple, Credit Union Bahenma, Muhammadiyah Malang University, PT Pertamina Patra Niaga, Credit Union Wita Mori, Koperasi Setia Kawan, and Christian Petra Surabaya University.

Company co-sharing scheme mostly financed the biodigester constructions in Bandung, West Java with a total number of 45 units. This number was mainly contributed by Perum Jasa Tirta II of their CSR Programme. Perum Jasa Tirta II create biodigester for cattle farmers that near Citarum River to prevent their cattle waste toward Citarum River.

Loan Funding Scheme for Biodigester Installation

The majority of loans for biogas development in 2022 is mobilized by the cooperative itself to users. This is rather different in comparation to last year, which several YRE cooperatives partners received external loan funds from other parties such as LPDB and RBF. Specifically for RBF, YRE continue to assist the loan grantees i.e. Koperasi Jatra Miguna in 2021 so that they continue to build biodigesters in 2022. Even though YRE has assisted the cooperatives through coordination and concept notes development for RBF, RBF funds have not succeeded in the disbursement. The reasons were mainly due to prioritization of RBF in managing their loan funds in 2022. However, there are still several cooperatives that provide loans independently to their members, such as the Setia Kawan Cooperative and KAN Jabung. Setia Kawan Cooperative built five biodigesters in Pasuruan, East Java using loan scheme with total loan of IDR 39,215,000. On the other side, KAN Jabung built two biodigesters with loan scheme with total loan of IDR 9,459,000, assisted by other funds from Indolakto.

Apart from that, there has been interest from Credit Unions (CU) in providing loans for biodigesters installation, as was done by the Jatra Miguna Credit Union through CPO Mitra Sarana Energi that built a trial biodigester with IDR 4,000,000 loan in Sleman, DI Yogyakarta; Bahenma Credit Union also conducted a trial construction of 15 biodigesters in partnership with CPO YLPMD Lampung with a total loan of IDR 143,700,000 in North Sumatra and Lampung areas; and the Wita Mori Credit Union, which funded in the construction of three biogas with CPO Rizky Abadi in Sulawesi.

IDBP gives impacts that are aligned with several SDGs. The impacts are measured through an annual survey of IDBP, the Biogas User Survey (BUS). The BUS is an important instrument to assess users' satisfaction rates towards biogas, evaluate technical performance of digesters, and its result is used as a source of annual carbon monitoring.

SDG 1 – No Poverty

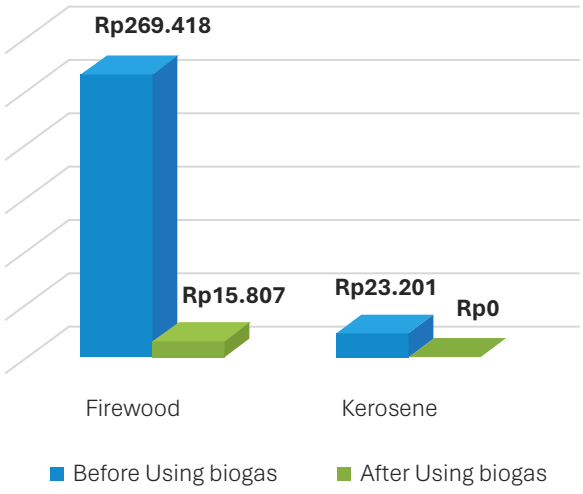

Figure 11. Fuel cost comparison before and a er biogas

There is a considerable amount of savings experienced by farmers after installation of biogas, significantly in number of firewood and kerosene use. According to BUS 2022, the average reduction in the quantity of firewood used per day from 12 kg/day to 1.9 kg/day, which equals to average savings of IDR 251,460 per month from buying the firewood after using biogas. The average reduction of kerosene use experienced per month is 0.73 L/day to none which resulting in decrease expenses around IDR 60.000 per month. In general, farmers' households estimate to have monthly household expenses saving up to IDR 84.000 by reason of lower fuel cost.

Other than lower fuel cost, farmers also experience lower cost of chemical fertilizer. This was because they utilize the bioslurry from biogas either for sale or using for themselves. Bioslurry has been leveraging the biogas value amongst farmers to gain more income or save monthly cost. Almost one-fifth of farmers (19.7%) use the bioslurry for themselves in 2022 with average saving from chemical fertilizer up to IDR 407,900. In 2022, only 1.7% of the farmers who sell the bioslurry while 11.5% was giving them for free to relatives or neighbours. However, the average amount of bioslurry sold by the farmers is 745 kg at the price of IDR 977 kg/month.

Half of farmers use the saved money, either from fuel cost or fertilizer cost saving, to cover additional household expense (50.0%) while others are using it for both saving and additional household expense (15.9%). A few of them utilize for additional school fee (8.1%) and both saving and additional school fee (5.3%). Compared to before having biogas, 75.6% of farmers currently experienced better social and economic living conditions in general.

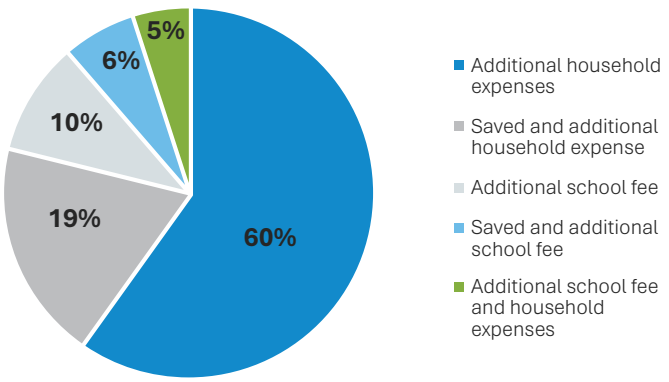

Figure 12. Utilization of money saved from fuel expense reduction.

SDG 2 – Zero Hunger

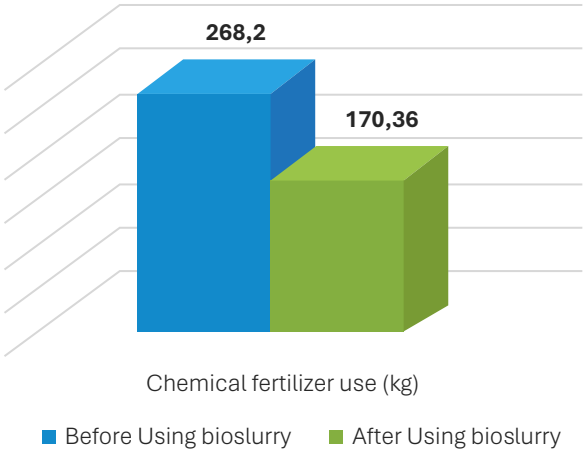

Figure 13. Chemical fertilizer consumption before and aer using bioslurry

Nearly a fifth of all respondents (13.9%) confirmed that they used bioslurry for their agricultural land. The utilization of bioslurry by farmers after using biogas is confirmed to have impact on reduction of fertilizer use from 268.2 kg to 170.4 kg of chemical fertilizer per application. Around 19% of respondents did confirm that their crop production tends to be increased after bio-slurry. This number is confirmed through BUS 2022. Meanwhile, YRE and PT PSN's demoplots for food-crops in East Java show an average increase of production up to 20% among 36% of the 111 demoplots. These findings could drive for an even more massive utilization of bioslurry as one of sustainable agriculture practice alternative.

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SDG 5 – Gender Equality

Prior to installation of biogas, usually there is a proposition and decision-making process among farmers' family members. It is shown that involvement in decision making process, construction, operation, and maintenance of biodigester, as well as attendance in biogas trainings are lower for women compared to men among biodigester users. However, from BUS 2022 it was confirmed that female family members (77.1%), will be most benefitted from biogas installation. This finding is aligned with comparation between women and men involvement in household chores, which showed that out of 7 chores assessed, women do all the domestic work except looking for firewood.

According to the survey, more than 80% of respondents answered that female family member will manage the money. It is common in the household that women are playing crucial role to manage household income, as shown below.

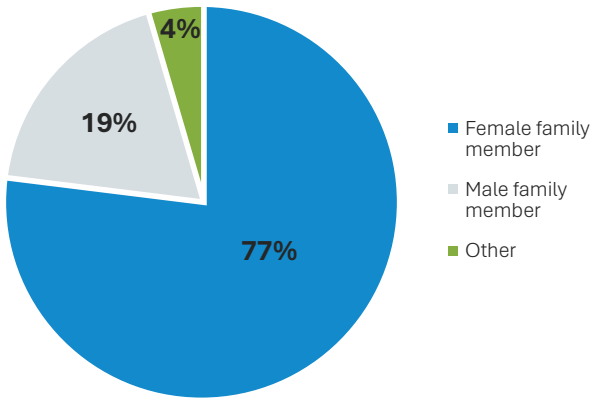


Figure 14. Beneficiaries' perception on who will be benefited from biogas

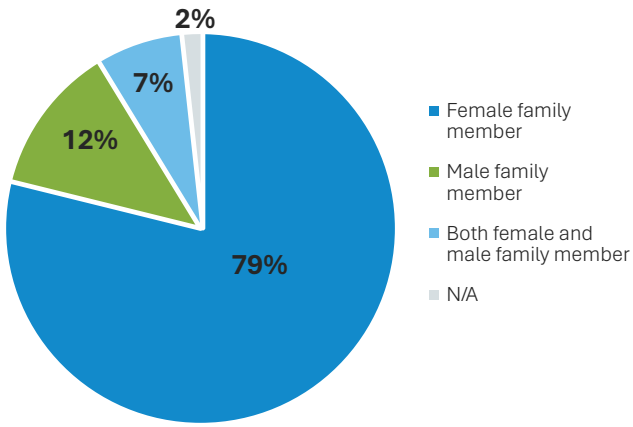


Figure 15. Family member who manage the household income

SDG 7 – Access to Energy

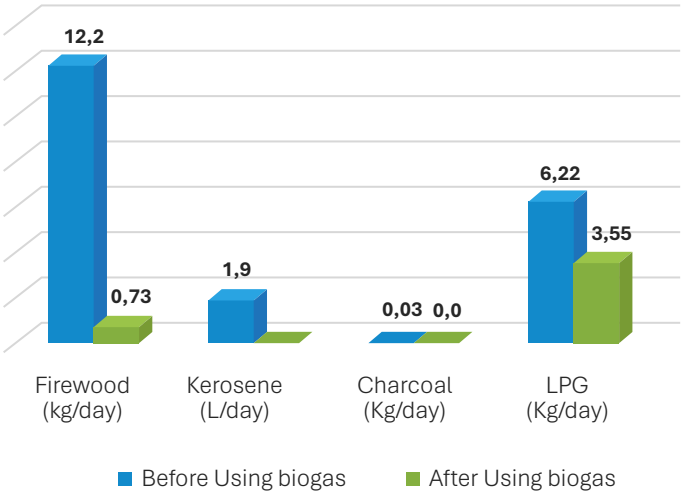


Figure 16. Fuel consumption comparison before and aer using biogas

SDG 13 – Climate Action

Biogas combustion through the conversion of methane into carbon dioxide has a positive effect on greenhouse gas (GHG) emissions. It reduces methane emissions from improved manure or waste management. Until December 2022, biogas installation and utilization through IDBP helps reduce **464,562 tons of carbon dioxide equivalent (tCO2e) of GHG**.

By transitioning away from biomass fuels, biogas also contributes to deforestation prevention. An average family size of biogas plants is considered to save up to 10 kg/day of fuel wood per annum. It indirectly promotes soil fertility and yields, also minimizes slash and burn practice or other land-use change activities that generate negative impacts on climate.

On the fuel usage before implementation of biodigester, there are reductions in firewood usage after the installation of biogas from 12.2 kg/day become 1.9 kg per day. There is also a reduction in the use of kerosene from 0.7 liter per day become almost none (0 liter/day). While for charcoal and LPG, the number goes down respectively from 0.026 kg/month to 0 kg/month and from 6.2 kg/month to 3.6 kg/month.

Involvement and Engagement of IDBP Team in External Events

- **Resource Person in Biogas Methodology Focus Group Discussion (FGD)**

  In September 2022, YRE was invited to be one of resource persons to share regarding Methodology Emission Reduction Calculation from Biogas that IDBP uses. The background of this FGD is the MEMR Regulation No. 22/2019 "Guidelines for Conducting GHG Inventory and Mitigation" that will regulate the methodologies of carbon calculation in each sector. DGNREEC of MEMR assisted by Market Transformation for Renewable Energy Effeciency - United Nations Development Programme (MTRE3 - UNDP) was in the process of drafting several emission reduction methodologies from bioenergy sector. Therefore, several methodologies that has been issued are intended as reference for emission reduction calculation in the SRN. As a practitioner, YRE uses methodology released by Gold Standard which is "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" (TPDDTEC).

  In this methodology, 3 components calculated are consumption of non-renewable biomass for cooking, consumption of fossil fuel for cooking (LPG, kerosene), and methane avoidance from cattle dung. YRE also shared how IDBP monitors each parameter using BUS data that is conducted annually in the FGD.

- **Domestic Biogas Comparative Study Site Host for MoEF and MEMR**

  Following up the development process of emission reduction methodology from bioenergy sector, MoEF and MEMR held a comparative study in objective to gain more information and knowledge on domestic biogas methodology that IDBP uses. YRE was requested as the study site host for their comparative study in November 2022. The first half of the day was occupied with detailed discussions regarding the Gold Standard's TPDDTEC methodology and its emission reduction calculations. Continuing with site visit to several biogas users' house in West Java, MoEF and MEMR staffs were introduced to the technology and its direct sage by YRE.

  This session is indeed important to have between the government and the actors in the field, so that mutual understanding and knowledge sharing is occurred.

- **Citarum Riverside's Waste Management Coordination FGD**

  On 3 November 2022, YRE was invited by the Department of Environment of the West Java Province to join a FGD to discuss "Coordinating of Livestock Waste Management in The Citarum Riverside". YRE shared how biogas technology performs as a solution for livestock waste management. One site in Pangalengan YRE has installed more than 100 units of biogas with support from Perum Jasa Tirta II. The users were also trained to utilize bioslurry for vermicompost, thus economic value apart from free gas could be developed by them.

- **Biogas Socialization in Central Java Province**

  Socialization regarding biogas program carried out by several department/agencies among local governments levels was including YRE as one of the biggest player of biogas in the area. In 2022 alone, socialization of the biogas program was held by Department of Energy and Mineral Resources of the Central Java Province – Telomoyo Subsidiary, Banyuroto Local Government and Department of Environment of the Magelang Regency.

  Under the Department of Energy and Mineral Resources program, the socialization was aimed to introduce the *Swakelola* Program in which implements biogas installation contribution funds from government, biogas user, and YRE. During the socialization, YRE took part in explaining renewable energy options, specifically biogas, and provided suggestions for program implementation. Technical discussions regarding biogas technology models were also carried out in these socializations.

Socialization to potential users by Department of Energy and Mineral Resources of the Central Java Province – Telomoyo Subsidiary

Socialization and *Swakelola* Program Evaluation by Banyuroto Village Local Government

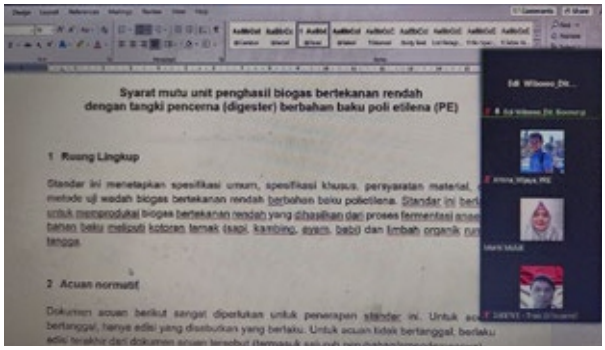
Socialization to farmer groups by Department of Environment of the Magelang Regency

- **Comparative Study at *Desa Mandiri Energi* in Boyolali, Central Java**

YRE participated in assisting a comparative study activity by Setia Kawan Dairy Farmers Cooperative (KPSP Setia Kawan) at *Desa Mandiri Energi* in Boyolali, Central Java. The participants in this comparative study were 17 representatives from the management and implementers of the cooperative. This activity aimed to provide an overview about the potential application of biogas in the *Desa Mandiri Energi* which is converted into electrical energy for chopper, lamps, refrigerators, etc. The results of this comparative study activity can inspire KPSP Setia Kawan participants to develop the biogas they have into electricity to reduce operational costs for farmers.

- **Member of Biogas Technical Committee for Biodigester National Standardization Development**

YRE was one of the members of the 27.10 Biogas Technical Committee consensus meeting with aim to advocate the standardization of biogas construction nationally to enhance Indonesia biogas market. YRE has been assisting in national standardization efforts for the manufacture and quality requirements for biodigester tanks made from polyethylene raw materials (BioMiru) SNI 9107:2022 entitled quality requirements for biogas producing units with biodigester tanks made from polyethylene raw materials. In August 2022, the 27.10 Solid and Gas Bioenergy Consensus Meeting finalized the RSNI Biogas Made from Polyethylene (PE) which was facilitated by the MEMR, BRIN, YRE and biogas stakeholders and all participants agreed that this RSNI was appropriate to become an SNI that could be used by the community for use. YRE also took part in the 27.10 Solid and Gas Bioenergy Technical Committee meeting discussing the SNI Biogas Model Fixed Dome in November 2022 and the developed biogas with construction materials from polyethylene (PE) was approved in December 2022.



- **Involved in Renewable Energy Roadmap Development for West Nusa Tenggara**

Involved in meeting and coordination with the governor's expert staff and Department of Energy and Mineral Resources regarding development of renewable energy use roadmap for province level scope with target of achieving 100% integrated renewable energy in accordance with carbon reduction target based on COP26 mandate. During COP26 in Glasgow, Indonesian government is also represented by West Nusa Tenggara Province. To synergize the roadmap target with renewable energy mix targets, several meetings with *Bappeda* and DPMPD were held. This effort was to encourage village level governments in mobilizing village fund budgets to support the provincial government's goals in accordance to alignment with the *RPJMD*.

- **Handed Over Biogas Swakelola Program for Samirono Village with Central Java Local Government**

  As one of stakeholders that took part in the Biogas Swakelola Program, YRE participated in the handover ceremony of 30 biodigester units in Samirono that Department of Energy and Mineral Resources have installed. This was attended by stakeholders from the Department of Environment, subdistrict and village government, and the beneficiaries. Provincial government, represented by its Deputy Governor, expressed his interest in the biogas technology model because it could benefit several aspects, such as waste, health, economics and energy. It is hoped that more biodigesters will be installed in this village without government assistance so that energy independence will truly be realized.

- **YSEALI Innovative Climate Leader June 2022**

  Young Southeast Asian Leaders Initiative (YSEALI) is the American government's flagship program to strengthen leadership development and networks in Southeast Asia. Through a variety of programs and engagements, including educational and-cultural exchanges, regional exchanges, and seed funding, YSEALI seeks to build the leadership capabilities of youth in the region, strengthen ties between the United States and Southeast Asia, and nurture the ASEAN community.

  YRE had the opportunity to be part of the YSEALI Summit, a hybrid program that involves alumni participating in YSEALI to be involved in eco-challenge activities and other volunteer activities with one work focus on innovative solutions to the problem of climate change. YRE, represented by the Executive Director, Rebekka Angelyn, was given the opportunity to participate in the Human Library session, namely sharing experiences about leadership journeys in climate action. Meanwhile, in the Tech Showcase session, YRE was represented by Jihan Ahmad to discuss with the participants about biogas technology in efforts to mitigate and adapt to climate change.

Engagement with the Government

- **Department of Agriculture and Food Security of East Java Province**

  The initial hearing and coordination with the Department of Agriculture and Food Security of East Java Province was an outreach to IDBP and its linkages to agriculture and bioslurry fertilizer company owned by YRE. In this engagement, YRE also brought the distribution permit issue onto the table because YRE has gone through assisting the process for 3 units of fertilizers and still hasn't been completed.

YRE also got inputs for the distribution permit process that could be informed to the 2 of YRE's cooperative partners, in which usually takes 3 – 4 months until it's completed.

- **Department of Agriculture and Food Security of Malang and Batu City**

In June 2022, YRE was awarded as one of WE4F S/SEA's innovators. The grant funding was then channeled to PT. Pupuk Suburkan Negeri to pilot 111 demoplots for food-crops in East Java. In order to socialize the project that YRE worked on, coordination with Department of Agriculture and Food Security of 2 cities in East Java that the project targeted was held. The initial coordination meeting was attended by both of Department's Deputy Head, as well as Head of Agriculture Division and Agriculture Section. By principle, both institutions welcomed and were open to support the program which YRE ran. They were happy to help if a specific location for demonstration plot is needed and could connect YRE directly with local agriculture field instructor.

- **Department of Energy and Mineral Resources of Central Java**

During the second half of 2022, YRE had intense coordination with Department of Energy and Mineral Resources of Central Java that discuss the possibility of legalization the cooperation between YRE and Department of Energy and Mineral Resources Central Java. It was recommended that cooperation be legalized within the provincial government level, hence the cooperation target could be set broader and open to other relevant agencies/departments that are aligned with YRE's intervention target. As an initial effort, a technical agreement regarding biogas program development in Central Java between YRE and Department of Energy and Mineral Resources was carried out and signed on November 2022. This was considered sufficient for both parties to cooperate and coordinate in relation to biogas construction recommendations, post-construction monitoring, and evaluation of construction partners.

- **Department of Energy and Mineral Resources of Central Java – Merapi Branch**

The audience with Head of the Department was in purpose of introducing YRE and its work that has been done in the Merapi Branch's area. To this date, installations of biogas in the area were brought by 2 groups of YRE's construction partners which are CV. H & B and CV. Duta Sukma. On that opportunity, YRE also informed the plan of biogas installation in Boyolali and Magelang by the construction partners with *Swakelola* Program and self-financing scheme.

Collaboration with External Parties

- **YSEALI Carrier Fellowship Program 2022**

During July to October 2022, YRE had the opportunity to host YSEALI Carrier Fellowship Program supported by *Persatuan Gaya Hidup Lestari Biji-biji* Kuala Lumpur. YSEALI Carrier Fellowship Program was a program that match and pair Career Fellows with host organization to perform specific projects identified by the host organization. YRE selected 4 fellows which were coming from Indonesia and Philippines. They were performing in two distinct groups to deliver marketing strategy for IDBP and to biodigesters technology development analyses for IDBP.

From the Marketing Strategy group, 7 promotion materials and marketing ideas were developed. They created infographic and posters with topics covering benefits of biogas, biogas user's satisfaction, women and biogas, local pride of biogas. They also developed vertical video concept note, sustainable energy webinar concept, partnership plan for bioslurry. Besides that, the Technology Development group defined technology for gas storage which then leaded to two options for small scale biodigester installation, the floating cover and gas bag.

- **Event CFD Desember 2022 "Ngobrol Energi Bersih di CFD"**

Car Free Day (CFD) is part of the healthy lifestyle of urban communities which is usually held on Sunday mornings. In Jakarta, CFD is implemented at several points, one of which is in the Central Jakarta area. YRE participated in an event entitled "Ngobrol Energi Bersih di CFD" organized by the Yayasan Madani Berkelanjutan on December 11th 2022. This activity was held in Taman Budaya Dukuh Atas area and aimed to campaign for clean energy, as well as the practice of using renewable biogas energy. This event was also enlivened by musical performances from Deredia and Endah N Rhesa. Apart from that, visitors also had the opportunity to experience a cooking competition using a biogas demo prepared by YRE.

- **Workshop dengan Sebumi September 2022**

YRE in collaboration with Sebumi held a Weekend Workshop titled "Turning Waste into Energy with Biogas" in September 2022. Sebumi is a community of sustainable lifestyle practitioner founded in 2018 that focuses on three pillars, namely education, experience, and adoption, with the ultimate goal of enabling a lifestyle sustainable for Indonesian society. The workshop was carried out at a biogas users' village in Bogor, West Java. It introduced biogas technology and the operation of biogas using a theoretical approach and direct practice. Began with a sharing session about sustainable lifestyles, the workshop was then continued with a discussion about biogas technology, and BioMiru as an option for household organic waste problem. The participants also had the opportunity to visit biogas user sites to see and practice the use of biogas directly.

- **Foot and Mouth Disease (FMD) Outbreak**

  Several provinces in Indonesia have been affected by FMD outbreaks since April 2022. As of June 2022, more than 200.000 cattle are affected and more than 6.000 died. Many of affected farmers are IDBP's beneficiaries which resulted in a 30% drop in milk supply from normal and an average spend of 60-90 million/day on medicines and disinfectants among dairy cooperatives. Not only limited to the farmers and dairy cooperatives, workers in the food production field were also got threatened with poverty and hunger due to the declining of the industry itself. The lack of socialization of accurate and reliable information among the farmers were one of the lead causes to unpreparedness of affected regions and community groups in dealing with the outbreaks.

  This is a tipping point for IDBP, as one of actors who work closely with farmers and agriculture field in Indonesia, to take animal health and welfare more into account. A comprehensive animal welfare intervention should be one of the upcoming focuses to be considered by YRE. The availability of cattle waste for biogas feedstock is one important thing, but the welfare and livelihood of the cattle is the foundation of a sustainable biogas intervention.

- **Carbon Economic Value Regulation**

  Ever since the issuance of Carbon Economic Value in Presidential Regulation No 98/2021, IDBP needs to adjust itself as one of the carbon project developers in Indonesia to the regulation. Requirement for any carbon trading activities to be carried out by a business entity has been hindering YRE from selling any carbon credits. The impact of it is the limited budget that IDBP has to run the program in the next year. The number of units that could be installed is expected to be very limited for 2023.

  Although it is considered as a small-scale project, IDBP needs to see program implementation and its carbon as part of a broader Nationally Determined Contribution (NDC) commitment in the national level for global emission reduction effort. Therefore, in effort to ensure the sustainability of IDBP,adjustments of the implementation and management must be made. Apart from that, intensive coordination and discussion with government stakeholders needs to be enhanced to smoothen the process that YRE will undertake to comply with the regulations and its technical regulations

- **Concentrated IDBP Construction Partners within Regions in Indonesia**

  IDBP operates in 19 provinces in Indonesia. However, numerous construction partners are only available in Java, Sulawesi, Bali and Nusa Tenggara region. Sumatera region only have a few, while currently there is none in Kalimantan and Eastern Indonesia region. The absence of construction partners and adequate materials in some areas has forced mobilization of mason groups and construction materials from other areas. This led to an increased price, making biodigester more expensive in those new areas. If IDBP are up to developing the biogas market equally among regions in Indonesia, cooperation with local institutions or companies to develop the program in new areas is very much needed. Penetration into new provinces or areas must be followed by training the local mason groups and connecting the construction partners with local stakeholders in an effort to explore biogas installation opportunities.

- **Enhancing Coordination with District Level and Provincial Level Government in Escalation from Department/Agencies Level**

  With regard to the downsizing of staffs and provincial offices in 2021, IDBP needs to find a way to maintain its grip on the local level. Local government is the ideal leading actor to continue the monitoring and evaluation of biogas implementation in their respective areas, hence a sustainable implementation could happen. To achieve this, coordination with district level and provincial level government needs to be enhanced by escalating the biogas issue initially from Department/Agencies level to the Government level. The success of installations and its value chain development in each area could also be considered as local government's-achievements and progress towards its NDC targets.

- **Transitioning IDBP to a Business Entity**

  In 2023, YRE must set up a business entity in accordance with the Carbon Economic Value Regulation. Transition plan is needed with a roadmap describing how to transfer the IDBP portfolio from YRE to the enterprise as well as transition arrangements for resources, workflows, database, stakeholder communication and branding. A comprehensive transition plan, that accurately describes the steps to be undertaken to achieve a successful transition, is intended for the establishment of an Indonesia-based company certified for carbon trading.

- **Scaling Up Biogas through Value Chain Strengthening**

  Strengthening biogas value chain is important to scale up domestic biogas, in terms of its installation numbers. Bioslurry utilization as a part of sustainable agriculture practices needs to be accelerated, hence adding the value of biogas apart from its direct fuel use for cooking benefit. The off taking bioslurry from IDBP users activity will be a successful effort if it is supported with market channels to plantation companies, rather than retail markets. In the upstream side, animal health and welfare should be seen as a target of intervention for farmers group. Exploring the possibility of biogas utilization to support industrial and/or large production activities is also needed to bring up the utilization scope of biogas technology.

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