



Sustainability and Resilience Kick-Off Workshop

CLEAN ENERGY TRANSITION & LAND-USE MITIGATION IN INDONESIA

Zoom Webinar Tuesday, March 16, 2021 14.00 WIB/8.00 CET

Thank you for your significant participation!

Speakers



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Participants and Media Partners



SUSTAINABILITY & RESILIENCE KICK-OFF WORKSHOP

REPORT

Executive Summary

To support the Indonesia's efforts to increase renewable energy and low-carbon development in addressing climate change, su-re.co together with European Commission partners, held an International Kick-off Workshop on two ongoing and one upcoming projects in Indonesia. The first project is LANDMARC (2020-2024), a European Commission (EC) project aiming to identify potential decarbonisation from biogas and compost. Secondly, TIPPING+ (2020-2023), another EC project, seeks to understand the tipping points in coal and carbon-intensive regions towards clean energy. Finally, the upcoming project that is currently in planning stage is the Biogas Initiative under IKI Small Grants (2021-2022) that aims to create a carbon offset scheme with biogas digesters and a blockchain system in Bali and East Nusa Tenggara. This Kick-off Workshop focused on indicating the areas that the projects could contribute.

On Tuesday, 16 March 2021, around 74 delegates from the industry sector, local and national governments, policymakers, NGOs, students, and researchers on an international scale virtually gathered in Zoom. At the beginning of the Workshop, the ongoing projects were introduced, including the activity scope and the outcome by each project coordinator. Overall, these projects aims to contribute to Indonesia's low carbon development for policy and technological implementation. Subsequently, policymaker representatives shared policy insights related to land-use mitigation and clean energy transition, i.e., the Ministry of National Development Planning (BAPPENAS) and Ministry of Energy and Mineral Resources (MEMR), respectively.

The purpose of Focus Group Discussion (FGD) is to synergize cooperation between stakeholders to be more applicable to Indonesia. Regarding land-use mitigation, bio-slurry application (a byproduct from biogas) as an organic fertiliser indeed is interesting to explore. In-situ measurement, modelling, and narratives will unfold the land-use mitigation technology in Indonesia. On the other hand, the energy transition towards clean energy in Indonesia is still ongoing from policy and market chain. From the stakeholder perspectives, replacing fossil fuels with clean energy sources (e.g., solar, geothermal) is feasible, with limitations to be addressed. Nevertheless, the TIPPING+ project potentially contributes to delivering the best interventions and assessing the effects in making the most substantial energy transition.

In the end, the consensus follow-up for the meeting included completing the following steps: a regular communication and dissemination (e.g. a series of workshops and policy dialogue) on the updates of the ongoing projects by su-re.co with the project partners and stakeholders. The subsequent workshops will be essential towards strengthening the relationship and the effective knowledge-sharing in implementing the projects to support the clean energy transition and land-use mitigation efforts for low-carbon development.



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Abbreviation List

B

BaU
Business as Usual, 15

BIG
Indonesia Geospatial Agency, 17

BMKG
Meteorological, Climatological, and Geospatial Agency
of Indonesia, 20

BMU
the German Ministry of Environment, 11

BPTP – Bali
Agricultural Technology Assessment Center of Bali, 20

D

DJEBTKE
Directorate General of New, Renewable Energy and
Energy Conservation, Ministry of Energy and Mineral
Resources, 20

G

GHGs
Green House Gases, 9

GIZ
Deutsche Gesellschaft für Internationale
Zusammenarbeit, 11

GOI
the Government of Indonesia, 14

GREENWIN
European Commission Project on Green growth and
win-win strategies for sustainable climate action, 12

I

IKI
German International Climate Initiative, 11

J

JIN
Joint Implementation Network Climate and
Sustainability, 9

L

LANDMARC
European Commission Project on LAND-use based
MitigAtion for Resilient Climate pathways, 9

LAPAN
Institute of Aeronautics and Space of Indonesia, 17

LCDI
Low Carbon Development Indonesia, 14

LMT
Land-based mitigation, 9

LMTs
Land-based Mitigation Technologies, 9

M

MW
Mega Watt, 19

P

PLN
The state-owned electricity company of Indonesia, 19

PLN – HSE Division
Division of Health, Safety and Environment, 20

R

RPJMN
The Mid-term Development Plan of Indonesia, 14

S

SDGs
Sustainable Development Goals, 9

T

TIPPING+
European Commission Project on Enabling Positive
Tipping Points towards Clean-energy Transition in
Coal and Carbon Intensive Regions, 10

TRANSrisk
European Commission Project on Transitions pathways
and risk analysis for climate change mitigation and
adaption strategies, 12

1. Project Introduction

1.1. Introduction of su-re.co Projects

By: Takeshi Takama (CEO of su-re.co)

This session briefly introduced the three projects that su-re.co is involved in: two European Commission Projects LANDMARC and TIPPING+ and the most recently awarded Biogas Initiative project under IKI Small Grants by GIZ. These three projects are expected to contribute to climate change mitigation and adaptation strategies in Indonesia. Before introducing the projects, some insights on carbon emissions and climate change impacts in Indonesia were presented.

At the global level, carbon emission after the Paris Agreement increased, and Indonesia is one of the few countries showing trends of increasing coal consumption. Indonesia is not exempted from climate change impacts. There is a rather conservative scenario for the next hundred years showing that Indonesia will experience a one-degree temperature increase. This scenario will have implications on the humidity, where the Southern parts of Indonesia are projected to be dryer while the northern parts will be wetter.

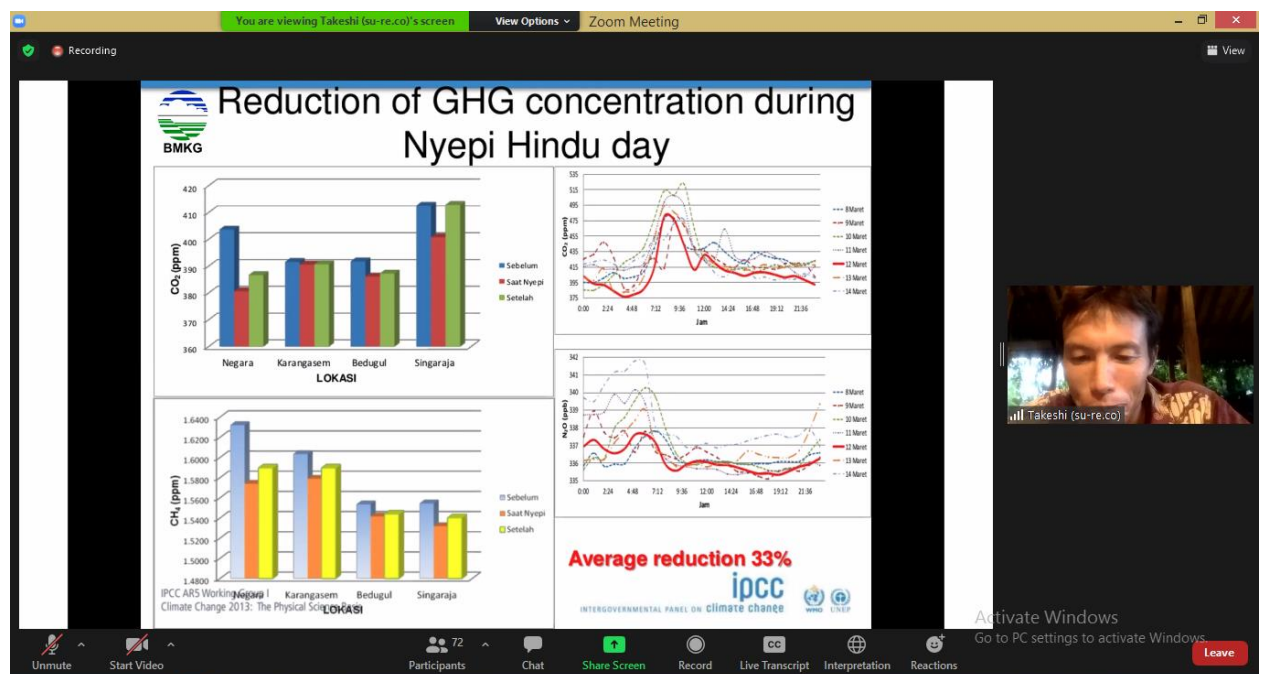


Figure 1. Carbon emission trend during Silence Day in Bali

Nevertheless, the potential of GHG reduction is still viable. For example, the global carbon emission decreased dramatically by 7%, which equivalent to the level of 15 years ago due to the COVID pandemic. At the local level, when residents of Bali are not allowed to do any activities, including driving, cooking, and using any lights during the Balinese new year, so-called Nyepi or silence day, a study from Indonesia Meteorological Agency (BMKG) also showed a dramatic decrease in carbon emissions during the period (Figure 1). According to the recent Low Carbon Development Indonesia (LCDI) report, Indonesia could reduce their GHG emissions by 43% in 2030.

To address climate change issues, there are several activities that have been carried out by su-re.co at the national and local level, including organising Climate Field Schools for farmers (in collaboration with BMKG Bali and BMKG NTT) and promoting biogas use for farmers in Bali and Flores islands. Biogas was emphasised as an exemplary technology because su-re.co aims to provide clean energy as cheap as possible. With these three projects synergized, su-re.co plans to upscale the current activities (Figure 2). From IKI Small Grants, su-re.co aims to channel carbon offset from biogas through a blockchain system. This project could contribute to TIPPING+ and LANDMARC projects in policy and science aspects, respectively. The three projects are expected to support the low-carbon development plan of Indonesia. Therefore, any potentially overlapping activities could be identified and synergised in this Kick-off Workshop as the starting point.

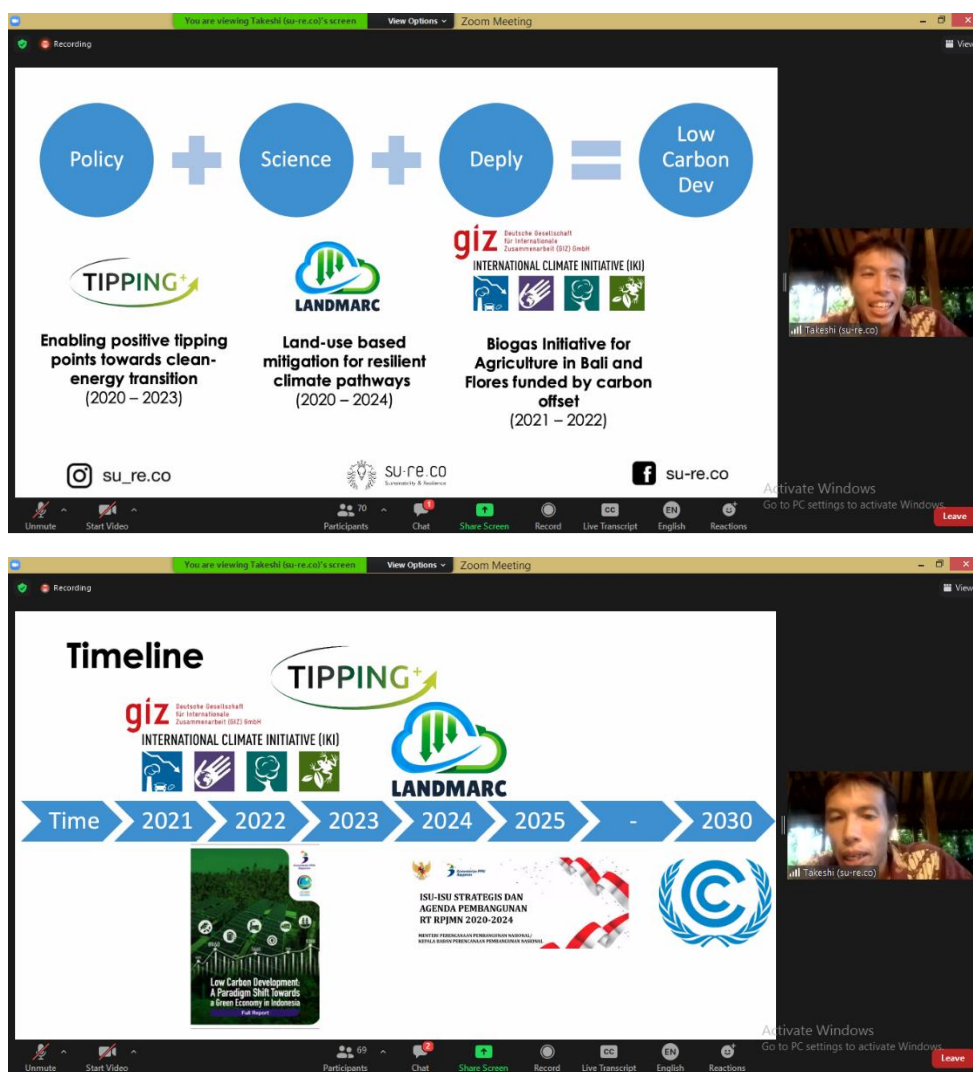


Figure 2. The expected contribution of LANDMARC, TIPPING+ and IKI Small Grants on low carbon development in Indonesia

1.2. Introduction to LANDMARC

By: Eise Spijker (JIN Climate and Sustainability)

The LANDMARC project explores "Land-use based mitigation for climate-resilient pathways". This project involves land-based mitigation & negative emission technologies and practices. The distinction between the two becomes crucial in the project. Land-based mitigation technologies (LMTs) include all re-based solutions that could store or keep carbon in soils and vegetation. This includes all kinds of forestry measures (avoiding deforestation), reduced tillage into cropping, agroforestry, biochar, composting, etc. LANDMARC project will look at the decarbonisation potentials of all available land-use based mitigation technologies and practices through the case studies, including Indonesia. Then, the scope will be up-scaled to the regional and global level.

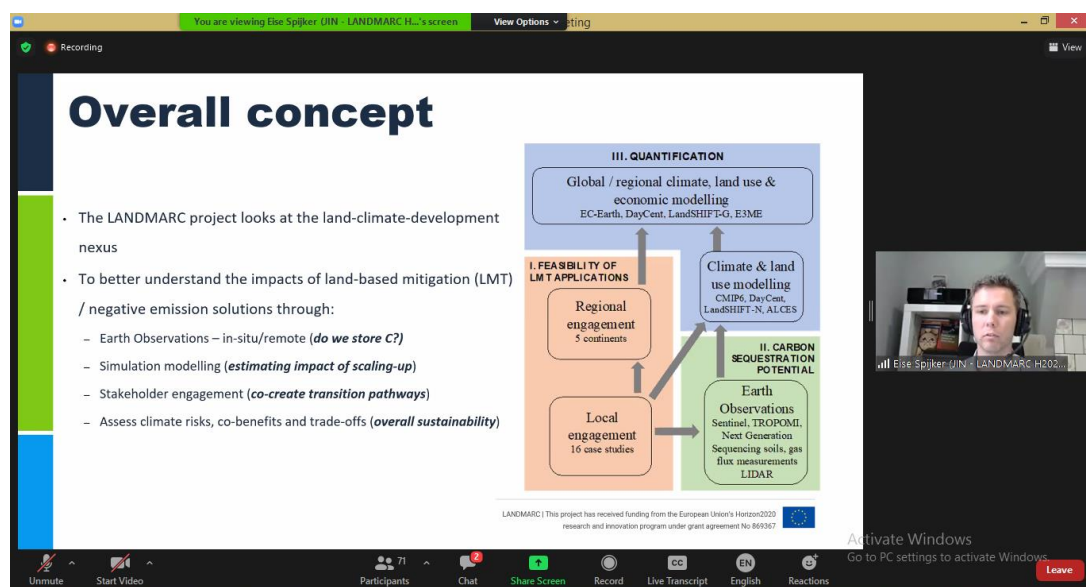


Figure 3. Overall Concept of LANDMARC

The overall concept of the project covers three pillars, namely (1) Earth Observation & simulation modelling, stakeholder engagement, (2) assessment of climate risks, (3) co-benefits, and trade-offs (Figure 3). The three pillars aim towards:

1. Co-creation and co-design with relevant stakeholders for validating and scaling the land-based mitigation solutions in different case studies and different continents to understand the overall impacts of the solutions.
2. Quantification of emission reduction done by earth observation, remote sensing satellite data and complemented with in-situ data (e.g., soil sampling) to measure carbon storage.
3. Modelling to quantify the overall impacts of all scenarios' regional and global level for land-based mitigation solutions.

The earth observation pillar provides information tools for GHGs (green-house gases) accounting. Then, the simulation modelling offers the quantification of carbon storage from the specific solutions. The co-design stage involving different stakeholder groups determines how realistic the proposed solutions are in addressing climate change as well as contributing to the Sustainable Development Goals (SDGs). The co-design is essential to understand the

impacts of the solutions because they influence public perception and acceptance. This set of the project activities can contribute to enriching low-carbon policy making. Moreover, the data and reports produced from LANDMARC could feed into policy strategies for carbon market accounting and land-use, such as agricultural management, agricultural support schemes, and force management schemes.

Currently, LANDMARC project partners are developing scoping analysis to select land-based mitigation technologies that can be used for simulation modelling exercises. In the coming months, the co-design process will commence based on the shortlisted negative emission solutions.

1.3. Introduction to TIPPING+

By: J David Tàbara - (Global Climate Forum)

The TIPPING+ project is working on enabling positive tipping points towards clean-energy transition in Coal and Carbon Intensive Regions (CCIRs). It is a three-year project which brings expertise mostly from social sciences yet offers an interdisciplinary approach. In general, this project aims to understand systemic change related to social and energy systems. The project's central question is to understand why and how coal and carbon-intensive regions could flip in one particular moment in time into a low-carbon energy trajectory. There are 15 partners and three associated partners with around 20 case studies. The case studies have the interlinkage in creating some ideas and extracting some lessons learned regarding clean energy transition. For example, the rare metal extraction for renewable technology in Greenland, coal mining in Eastern Europe, the downstream energy-intensive activities like in Indonesia, and sustainable tourism in Southern Europe¹.

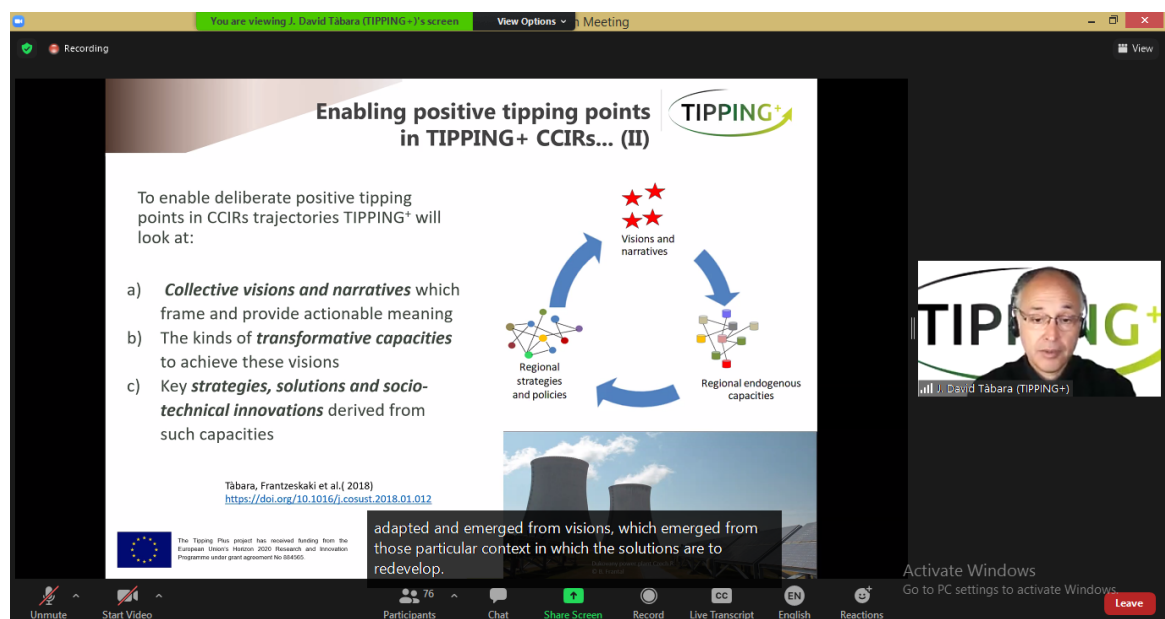


Figure 4. Overall Concept of TIPPING+

There are three main aspects of the project focus. Firstly, identifying the underlying forces of change (e.g., structural change, environmental change, new information knowledge system)

¹ See more details about TIPPING+ case studies: <https://tipping-plus.eu/case-studies>

act as endogenous or exogenous pressures. Secondly, tipping events and tipping interventions lead to a systemic change (hardly known beforehand). The tipping events may suddenly precipitate into a tipping point because of accumulating and interacting with the underlying forces of change. Lastly, the project would assess the effects of those changes in an interdisciplinary manner.

Depending on the type of interventions, the tipping points could be negative or positive. Positive tipping points in this project refers to increasing societal resilience and reducing climate change harms, whereas negative tipping points are the opposite. A core aspect in this conceptualisation of positive tipping points is the transformative visions or narratives of the agency that potentially create alternative pathways towards low carbon development (positive effects) (Figure 4). Notably, once tipping points occur, the effects are not linear, from the grey economy towards the green economy. However, the shift might involve an economic diversification (i.e., from a highly dependent economy to a more diverse economy), thus multi-sectoral changes.

As an update, some preliminary ideas and insights have been identified after one year of commissioning. The COVID Pandemic seems to expedite the energy transition towards clean energy, for example, the early closing down of some coal mines in Eastern Europe. However, it is unclear whether such an event will bring positive or negative effects to the system. Therefore, institutional innovation and transformation become essential to ensure the generation of positive outcomes. The outputs of TIPPING+ are expected to contribute to policymaking through stakeholder engagement (e.g., policy dialogue) and dissemination.

1.4. Introduction to IKI Small Grants in Indonesia

1.4.1. Introduction to IKI Small Grants

By: Florian Herzog (GIZ)

International Climate Initiative (IKI) has the most significant funding from the German Ministry of Environment (BMU). It has supported more than 730 climate and biodiversity projects in more than 60 countries with an overall funding volume of about EUR 4 billion since 2008 (Figure 5). In the mitigation context, IKI supports partner countries in developing and implementing innovative instruments to reduce GHG emissions. The goal is transformation towards a sustainable and low carbon economy, including contributing to the nationally determined contributions (NDCs).

IKI Small Grants is part of the family of different IKI Funding Programs and looks for local solutions and local organisations also supporting innovative mitigation projects. The project supports strengthening bottom-up and context-tailored solutions and the capacity of the local organisations. The solutions are expected to bring transformational change and uphold participation from various actors, which are critical for achieving national climate change and biodiversity goals. From the IKI perspective, the Biogas Initiative Project by su-re.co is considered as an interesting project and is the only project selected from the country as of 16th March 2021.



IKI Small Grants vision

- IKI Small Grants supports **local climate and biodiversity** projects in **ODA countries**
- The **BMU** provides **up to 30 million Euros** for a **period of six years** with GIZ implementing this programme
- **Implementing party:** Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- Our goal is to find **local solutions** provided by **local organisations!** We aim to support bottom-up, context-tailored, creative ideas and to strengthen capacities of smaller organisations
- In the **first call** of IKI Small Grants – International Calls – **38 projects** were selected in **27 countries**

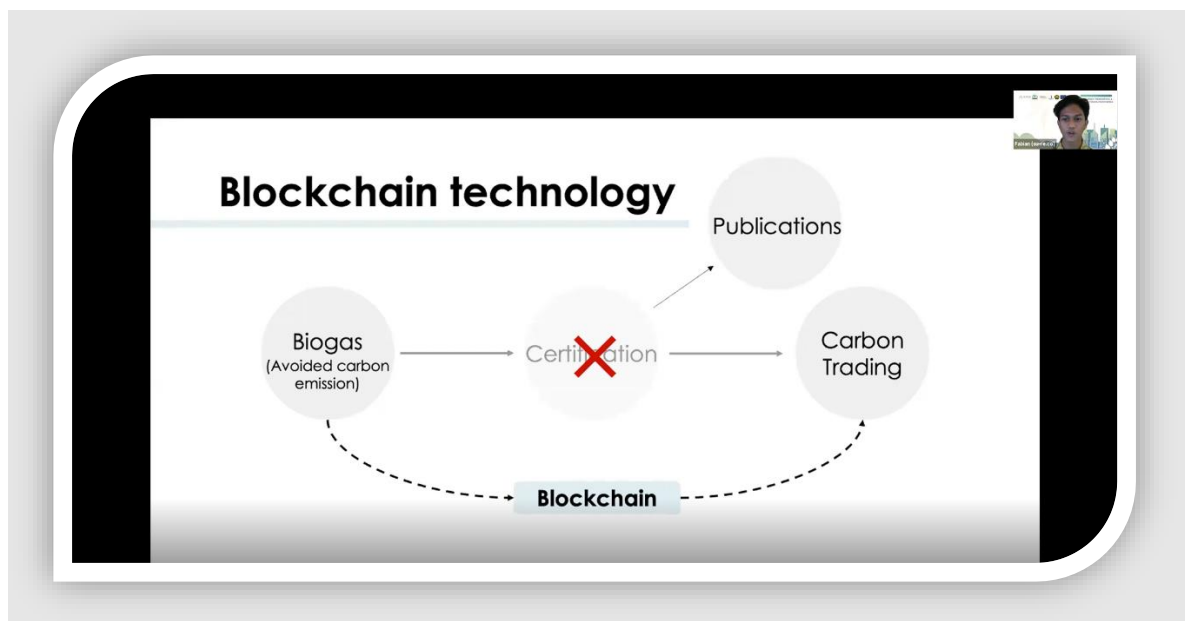
giz

Figure 5. The scope of IKI Grants

1.4.2. su-re.co's Biogas Initiative under IKI Small Grants

By: Fabian Wiropnanoto (su-re.co)

su-re.co's biogas journey started in 2016 with two European Commission Projects GREENWIN and TRANSrisk, to provide affordable clean energy to smallholder farmers with a frugal design. There are over 25 biogas digesters installed across Bali and Flores for mainly coffee and cocoa farmers. However, su-re.co is eager to reach more expansive areas and plans to upscale the activity by introducing blockchain technology into the current technology.



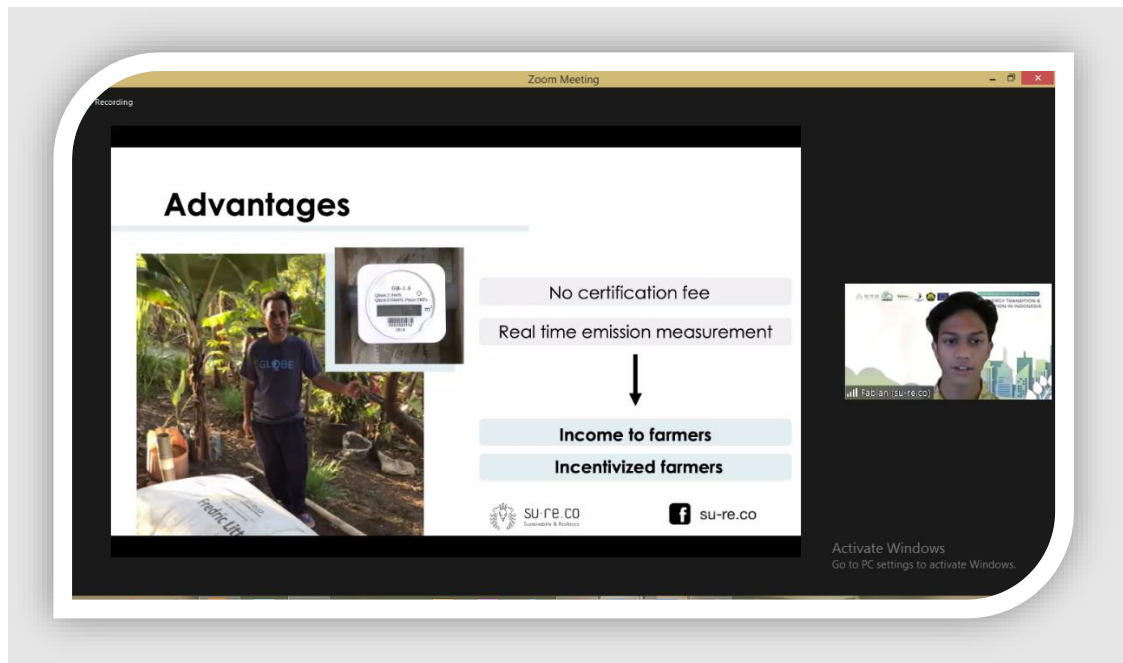


Figure 6. su-re.co's Biogas Initiative with IKI Small Grants

The use of blockchain for the biogas initiative is motivated by the fact that carbon offset certifications are costly. Blockchain technology can provide real-time measurement of carbon reduction to be traded, hence cut the certification costs (Figure 6). To ensure the reliability and legitimacy of the system, su-re.co aims to produce a scientific publication of the emission reduction potential. Ultimately, this will incentivise the farmers to use biogas digester. Operating under IKI Small Grants, the target of this initiative until 2022 are the followings:

1. Installing 40 biogas digesters with the blockchain technology
2. Creating a carbon offset purchasing platform
3. 40 farmers have participated in our Climate Field School as part of capacity building strategy to ensure the proper use of the technology among farmers

After the presentation, several questions were clarified regarding the project scheme. The selection of coffee and chocolate farmer was clarified, where these farmers will reap the most benefits from the digester. Additionally, we can purchase the product of these farmers for our circular business model – su-re.coffee and su-re.cocoa products. Most notably, concerns regarding blockchain technology's carbon footprint were raised, which would counteract the project's overall plan. In this feedback, su-re.co will keep in mind selecting blockchain systems with the lowest carbon footprint while considering the emission when calculating the carbon offset of each biogas unit.

2. Policy Perspective on Clean Energy Transition & Land – Use Mitigation in Indonesia

2.1. Decarbonisation Policy Planning from Land Use Management

By: Irfan Darliazi (Ministry of National Development Planning or BAPPENAS)

A recently established policy initiative by the Government of Indonesia (GOI) called Low Carbon Development Indonesia (LCDI), was introduced in this session. This initiative aims to create a balance and minimise the trade-off between economic development and environmental protection. Furthermore, LCDI is derived from the GOI's intention to comply with SDGs. Climate change may impede the progress of GOI plans on environmental aspects and socio-economic aspects. GOI then integrates LCDI into the Mid-term Development Plan (RPJMN) starting from RPJMN 2020 – 2024 onwards. Currently, GOI examines the policy recommendation based on scientific and analytical works that support how Indonesia responds to the climate change impacts while maintaining socio-economic growth in the prioritised sectors. There are three priority programs in RPJMN 2020 – 2024 to LCDI:

- 1) Improvement of environmental quality
- 2) Improvement of disaster and climate risk
- 3) Low carbon development

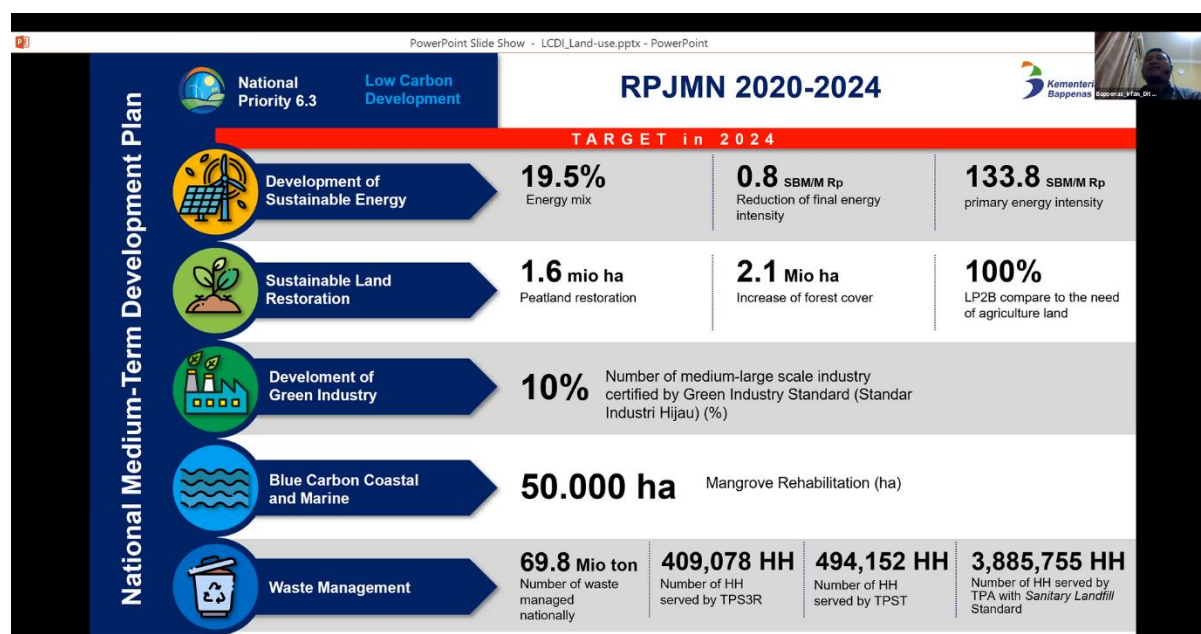


Figure 7. The prioritised sectors under low carbon development programs

There are five priority sectors under low carbon development (Figure 7): sustainable energy, sustainable land restoration, green industry, blue carbon coastal and marine, and waste management. In sustainable land restoration, GOI will focus on the peatlands, forest areas, and agricultural lands. The peatland restoration is carried out by implementing 3R (rewetting, revegetation, and revitalisation of livelihood). Land restoration in forestry involves reforestation and avoiding deforestation. The repair in forest areas is highly connected to agricultural productivity – low productivity of agricultural land leads to deforestation. Therefore, GOI aims to increase agricultural land productivity to reduce deforestation simultaneously through, for

example, the application of organic fertiliser (including from biogas) and the use of low-emission varieties.

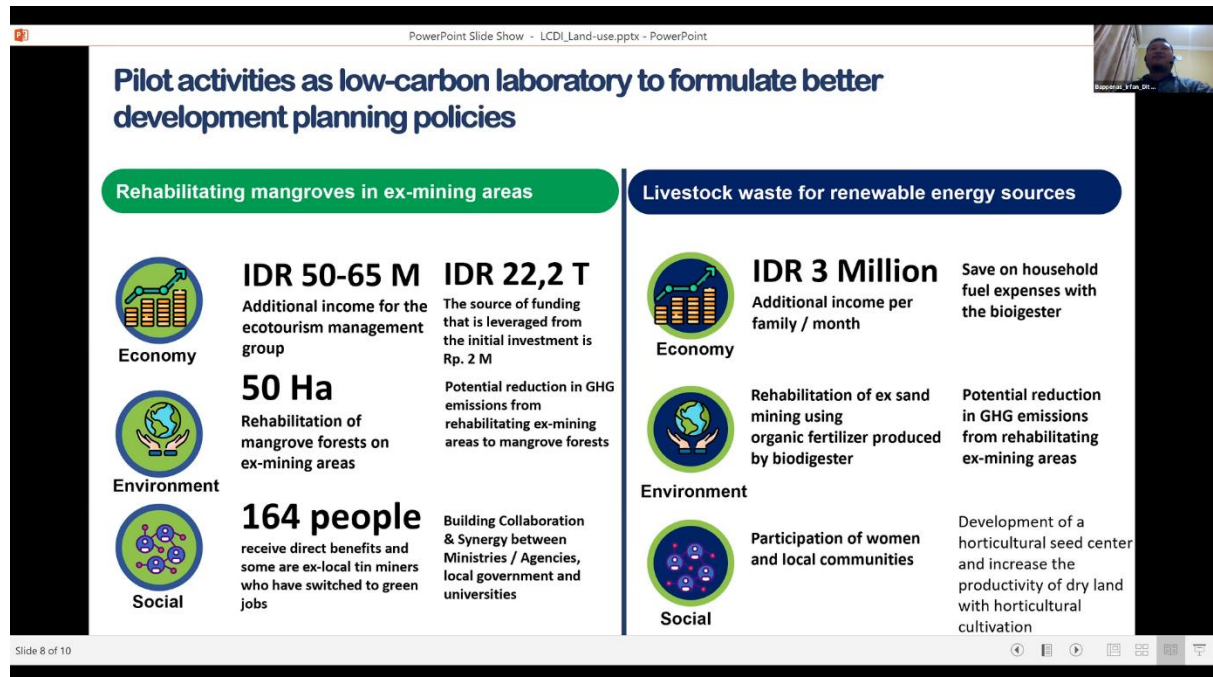


Figure 8. Example of pilot projects by BAPPENAS related to land restoration, clean energy and organic fertiliser

In carrying out LCDI, a series of assessments are conducted to assist the implementation stage, such as climate forecast, disaster risk, and hazard and vulnerability assessment to address climate change impacts at the provincial level. For instance, BAPPENAS has an agriculture adaptation map to show the prioritised locations to address climate change, particularly rice paddy cultivation. Various pilot projects are currently undergone to provide evidence-based policy input related to land restoration—for instance, the project related to mangrove rehabilitation in Bangka Belitung (Figure 8). The rehabilitation is in a former coastal mining area that is transformed into ecotourism, bringing environmental and socio-economic benefits. In the activity, livestock waste is also used for the rehabilitation of ex-mining areas.

2.2. Clean Energy Transition Policy Planning

By: Trois Dilisusendi (Ministry of Energy and Mineral Resources or MEMR)

This session fed the updates on the energy transition in Indonesia. The clean energy transition in Indonesia is motivated by the country's global commitment to the Paris Agreement. The commitment is then translated to a national level policy, Law No. 16/2016, to reduce GHG emission by 29% from business as usual (BaU) voluntarily and 41% with international support by 2030. The energy sector is assigned to contribute 314 – 398 million tonCO₂e (38% of the total GHG emission reduction) through renewable deployment, energy efficiency and conservation, and green energy technology application. In terms of primary energy, coal and renewable usage shows an increasing trend, whereas oil and gas usage tends to decrease. In 2020, the emission reduction from the energy sector achieved 64.4 million tonCO₂eq. Nevertheless, GOI aims to accelerate the renewable deployment to meet 23% by 2025 and is optimistic about fulfilling the target. The reason behind its target is that Indonesia has renewable energy potential amounting

to 417.8 GW, while the installed capacity is only at 2.5% (10.5 GW) from the potential resources (Figure 9).

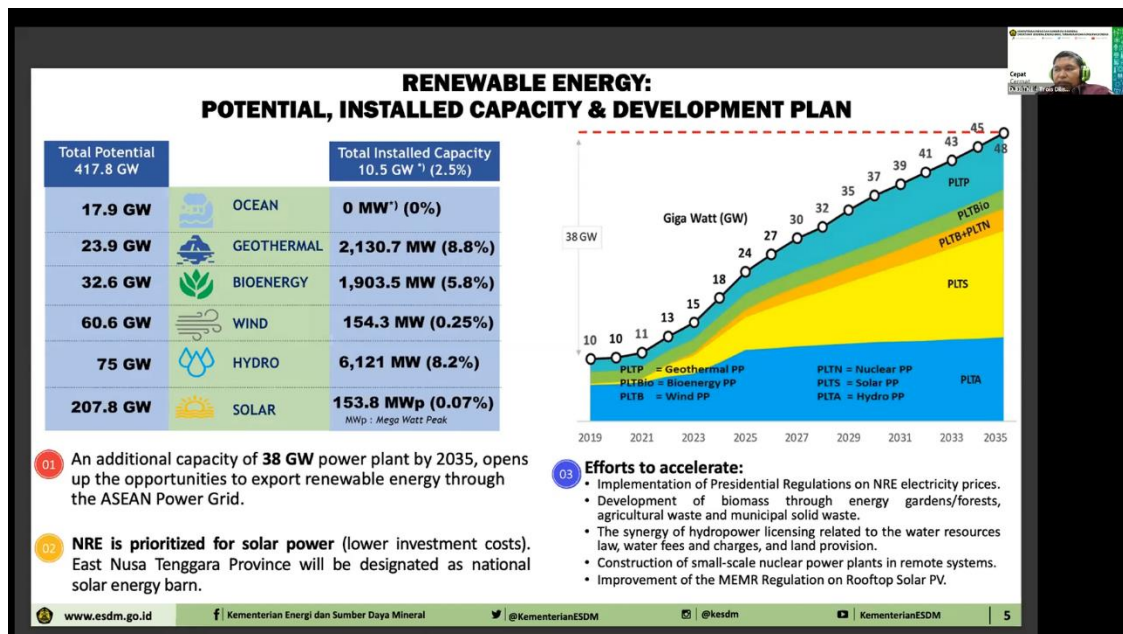


Figure 9. The potential of renewable in Indonesia until 2035

There are several strategies of GOI until 2035 in accelerating clean energy transition while meeting the energy demand, as followed:

- 1) Primary energy substitution by using the existing technology, biofuel blending (B30 – B50), co-firing and RDF utilisation
- 2) Fossil primary energy conversion: replacing diesel and coal power plants with renewable energy (approximately 5,200 diesel power plants)
- 3) Adding new capacity of renewable power plant (focusing on solar power plant). This strategy includes several programs, as the followings:
 - a. Geothermal deployment up to 9.3 GW
 - b. Solar energy adoption up to 38.7 GW
- 4) Non-electricity biofuel utilisation (from biogas and agricultural product)

In implementing the strategies mentioned above, GOI attempts the system's readiness to adopt renewables given the intermittency and the affordability of electricity price. On the other hand, GOI still encounters other challenges, such as increasing oil and LPG imports, decreasing coal export (due to green energy movement that leads to economic loss), and insufficient gas and electricity infrastructure. Hence, the government expects active roles from all stakeholders to address the challenges above in accelerating the clean energy transition.

3. Scope of LANDMARC and TIPPING+ in Indonesia

3.1. LANDMARC in Indonesia

By: Siti N. Indriani (su-re.co)

The focus of LANDMARC in Indonesia was introduced. This case study aims to understand the impacts of Land-based Mitigation Technologies (LMTs) at the local level, which then will be upscaled to the national and regional level. The research questions include the impacts of LMT implementation and how to assess LMT at the local and national levels. The three case studies in Indonesia concern the decarbonisation potential of agroforestry and biogas and compost in Bali and Bajawa, Flores. LANDMARC covers six LMT categories (agriculture and agroforestry, forestry, soils, other ecosystems, biogenic/waste management, and bioenergy with carbon capture storage (BECCS)). The focus of the Indonesian case study will be on three of these categories, namely: agriculture & agroforestry and biogenic waste management for biogas and compost implementation. Before identifying the decarbonisation potential of LMT, the development of available LMT in the reference system is necessary as the initial step. This phase involves several steps, as follows:

- 1) Developing national LMT portfolio
- 2) Stakeholder engagement
- 3) Model matchmaking
- 4) Data collection

For the current progress, su-re.co has done model matchmaking within the case study scope with the LANDMARC modelling partners. The process involves data collection for the simulation and modelling. Together with TIPPING+, online interviews and stakeholders' engagement have been carried out to identify Indonesia's LMT portfolio, involving many stakeholders from different perspectives, such as Indonesia Meteorology Office (BMKG), Indonesia Geospatial Agency (BIG), Institute of Aeronautics and Space (LAPAN) for climate, meteorological & remote sensing, while MEMR and BAPPENAS for policy insights.

3.2. TIPPING+ in Indonesia

By: Cynthia Ismail (su-re.co)

Regarding the research framework, three aspects are considered in implementing the case study. Firstly, TIPPING+ for Indonesia case study will focus on Bali and Banten Province, particularly in two sectors: coal usage in the electricity system and biogas development. As background, both provinces have already achieved a 100% electrification rate. However, Bali and Banten are still dominated by unsustainable fuels. For example, coal is still dominant in the electricity system, while firewood usage is still dominant for cooking in rural areas. Banten and Bali are selected as the case study because both provinces are essential in supporting Indonesia's economy, in which



Banten is one of the backbones for meeting the electricity demand of the Java-Bali grid. In contrast, Bali is one of the contributors to the country's foreign exchange from tourism.

Secondly, the research questions of this study, among others are as followed:

- 1) Understanding how social and ecological domain could contribute positively in reinforcing or transitioning the system of reference towards more clean-energy oriented (at least for the past ten years)
- 2) Exploring the capacities and interventions of relevant stakeholders that could potentially transform the current situation towards low carbon development,
- 3) Assessing the effects of the transformative interventions

The narrative analysis will be used to understand the transformation storytelling from the recent past of the context and the transformative capacities and interventions. Moreover, visioning is imperative to explore future low-carbon pathways from the 'stakeholders' perspective. On the other hand, socio-economic modelling will be utilised to estimate the effects of the transformative interventions.

Currently, collecting narratives and visions from relevant stakeholders is undergoing in addition to desk research to identify the stakeholder capacity, the interventions, and the agency. Hence, this implies active participation from pertinent stakeholders, from policy, business and market chain.



4. Synergising Potential Collaboration of LANDMARC and TIPPING+ in Indonesia

4.1. Discussion 1: Potential Collaboration for TIPPING+

This discussion aimed to identify the current activities or interventions by the Indonesian stakeholders (Table 1) aligned with the scope of TIPPING+, which may potentially transform the current system (significant effects on social, economic, and environmental aspects). Afterwards, potential collaborations were identified to synergise the activities and devise the most appropriate interventions. Throughout the discussion, the shared perspectives mainly came from two leading electricity companies in Indonesia, PLN (the state-owned electricity company) and Indonesia Power (the subsidiary electricity generation company of PLN).

In terms of clean energy adoption, PLN plans to install electricity (around 6,200 MW in 2025 and 16,000 MW by 2028) from renewable energy source (e.g., geothermal, hydro, solar, biofuel, etc) according to the company's ten-year electricity supply plan (RUPTL). Meanwhile, the additional capacity requires a minimum of 45,000 MW by 2025 to meet the mandate of 23% by 2025. This implies that the drastic addition of renewable in the system might not be feasible if the renewable deployment is solely from the RUPTL. This unambitious target is due to intermittent and site-specificity of the renewable energy deployment. Amending the RUPTL might be challenging because of the corporate capacity and the existing grid (which cannot cope with the intermittency). Nonetheless, the RUPTL is an essential reference for renewable deployment in electricity generation.

Meanwhile, Indonesia Power (IP) shared that various renewable projects are ongoing, including hydro, geothermal, wind (in Eastern Indonesia), biomass, biogas, and residential solar energy. The development of some renewables like hydropower and geothermal have limitations. Geothermal development is high risk (requiring significant investment), while water availability becomes a concern in building the new hydropower plants. Additionally, institutional barriers prevent a more diverse energy holding; thus, it is more concentrated in a few large companies. So far, the best approach from IP's perspective is to operate in a hybrid energy system – combining renewables with thermal power (using fossil fuels). Regarding biogas technology, IP aims to upscale the technology from the research stage to pilot projects, particularly biogas to electricity. According to IP, the potential activities that TIPPING+ could contribute are the economic assessment on upscaling biogas technology, not only from manure but also municipal waste in each region.

Overall, the energy transition towards clean energy in Indonesia is still ongoing from policy and market chain. From the stakeholder's perspectives, replacing fossil fuels with clean energy is feasible, with limitations to be addressed. Nevertheless, the TIPPING+ project potentially contributes to delivering the best interventions in making the most meaningful energy transition for all parties.



Table 1. Participant list in breakout room of TIPPING+

Institution	Participant
TIPPING+ coordinator (GCF)	J. David Tàbara
UGN (Czech)	Stanislav Martinat
Directorate General of New, Renewable Energy and Energy Conservation, Ministry of Energy and Mineral Resources (DJEBTKE)	Ashri Uswatun Nisa
DJEBTKE	Ahmad Faqih Mahalli
DJEBTKE	Rizka D.
PLN – HSE Division	Melly Priliani
PLN – HSE Division	Vini Charloth
Indonesia Power	Anna Reani
Indonesia Power	Brian Kalti P
su-re.co	Cynthia Ismail
su-re.co	Takeshi Takama
su-re.co	Fabian Wiopranoto
su-re.co	Sarah Wibisono

4.2. Discussion 2: Potential Collaboration for LANDMARC

Similar to the break-out discussion for TIPPING+, this discussion objective is to synergise potential collaborations among Indonesian stakeholders regarding land-use mitigation technologies and practices. Some activities and deliverables under LANDMARC were firstly introduced in detail by some consortium members. At the initial stage of the project, Agroinsider and Bioclear Earth, as a part of LANDMARC consortium member, are responsible for developing sensing maps and selecting the management zones in case studies by smart soil sampling strategy to quantify the carbon storage capacity in addition to LMT validation from stakeholder perspectives. At the later stage, the impacts of the LMTs will be assessed in a multifaceted manner, for instance, bio-geochemical and socio-economic modelling for the organic fertiliser application on the agricultural land from composting or biogas project.

Most of the participants were engaged and interested to have a collaboration with the LANDMARC project. BMKG (Meteorological, Climatological, and Geospatial Agency) Silangit, North Sumatera, seeks to extend the biogas use integrated with estate crops (i.e., coffee and cocoa). Sustainable farming practices were also discussed to find a solution for farm irrigation in Toba Lake regency, North Sumatera. The discussion continued to compare the sustainable farming practices in Europe and Indonesia. Besides, the climate field school for farmers was planned to align with BMKG national program. Together with BMKG Jembrana, Bali, su-re.co have conducted this activity for five years.

Furthermore, BPTP – Bali (Agricultural Technology Assessment Center of Bali) aims to integrate biogas installation with other sustainable cropping strategies, such as the water provision in dry areas. On the one hand, maintaining prolonged use and scaling biogas is rather challenging, and this condition is still encountered in other countries, including in European countries. As part of LANDMARC scope, the



decarbonisation potential from the bio-slurry application as the organic fertilizer (by-product biogas) ought to bring new insight to promote and maintain long-term use of biogas technology.

Some participants suggested potential activities like irrigation infrastructure and rewetting practice during the discussion. However, the activities are not mainly the focus of Indonesia's case for LANDMARC. The sustainable agricultural practices and water issues are further explored in other LANDMARC case studies, for instance, sustainable rice production in Nepal that would address water scarcity in rice cultivation in addition to reducing methane emission². Additionally, a knowledge-sharing event is planned in the later stage of the project, not only among the project members but also with the respective stakeholders, to build the understanding of different LMTs.

Table 2. Participant list in the break-out room of LANDMARC

Institution	Participant
Agroinsider	Patricia Lourenço
BMKG Silangit – Silangit Meteorological, Climatological, and Geophysical Agency	Melanthon Haloho
BMKG Sulawesi Selatan	Rakhmat Prasetya
BPTP Bali – Bali Agricultural Technology Assessment Center	Hadis Jayanti
Cambridge Econometrics	Eva Alexandri
ETHZ (Eidgenössische Technische Hochschule Zürich)	Moritz Laub
Iwatani.co	Yosuke
JIN - LANDMARC	Eise Spijker
MPH	Putri Ghina Minhaj
su-re.co	Amanda Ramadhani
su-re.co	Bambang Wisanggeni
su-re.co	Siti Indriani
su-re.co	Kyla Langotsky
su-re.co	Natasha Ikhsan
TU Delft	David Ismangil
	Gung Rudy

² See more details on LANDMARC case studies: <https://www.landmarc2020.eu/case-studies>



Concluding Remarks

The Kick-off workshop speakers left the meeting with a good overview of the scope for the TIPPING+, and LANDMARC projects, and the recently awarded Biogas Initiative Project under the GIZ IKI Small Grants. The goal of where and how su-re.co can support Indonesia's policy process related to decarbonisation and clean energy transition is highly anticipated. Insightful inputs were gathered for each project throughout the presentation and the discussion session.

For the TIPPING+ project, PLN's RUPTL (National Electricity Supply Business Plan) was emphasized as a necessary reference in initiating plans of renewable energy implementation. Meanwhile, a research collaboration between European Commission partners seems possible, specifically in conducting an economic assessment of biogas from animal and municipal waste. On the implementation side, biogas by-product, bioslurry, application for agricultural and agroforestry land are of many stakeholder's interests under the LANDMARC project. For one, integrating the biogas technology with estate crops and other sustainable technologies to extend the application in supporting vulnerable areas. For instance, exploring the decarbonisation potential overlaps with various agricultural and forestry strategies. Although there was no discussion room focused on the IKI small grants project, the initiative received positive feedback regarding how blockchain technology optimising carbon footprint mechanism in biogas business model.

The insightful input from the overall 21 organisations of this first meeting was highly appreciated. There were much enthusiasm and commitment expressed by all participants for future collaborative work in the areas outlined. Concrete next steps as follows:

- Follow-up on relevant collaboration opportunities on decarbonisation research, biogas economic modelling, and biogas deployment.
- Preparation for the second regular Workshop in the second quarter of the year.

In summary, the Kick-off Workshop set the basis for strengthening and optimising coordination with all partners. It is hoped the active engagement will continue by having all participants come together again for the next Workshop.



Appendix

Appendix 1. Event Agenda

Time (Bali Time)	Activity	Speaker
15.00 – 15.10	Opening and welcoming	MC and Moderator (su-re.co)
Introduction Session		
15.10 – 15.20	Introduction: su-re.co projects	Dr. Takeshi Takama, CEO of su-re.co
15.20 – 15.30	Introduction: LANDMARC	Eise Spijker, Project Coordinator of LANDMARC
15.30 – 15.40	Introduction: TIPPING+	J David Tabara, Project Coordinator of TIPPING+
15.40 – 15.55	Introduction: IKI Project	Florian Herzog and Fabian (su-re.co) IKI Small Grants GIZ Representative
15.55 – 16.05	Stakeholders QnA	Moderator
16.05 – 16.15	Students QnA	Moderator
Presentation Session		
16.15 – 16.30	Presentation 1: Irfan Darliazi S.E., Decarbonisation Policy Planning from Land Use Management in Indonesia	MERE, Planner of Directorate for the Environment, Ministry of National Development Planning (BAPPENAS).
16.30 – 16.45	Presentation 2: Trois Dilisusendi S.T., M.E. Indonesia's Clean Energy Transition Policy Planning	Ministry of Energy and Mineral Resources – Directorate of Bioenergy
16.45 – 17.05	General + Students QnA	Moderator
5-minute break		
Focus Group Discussion		
17.10 – 17.30	<i>Indonesia Case Study</i> <i>Presentation:</i> <i>TIPPING+ and LANDMARC</i>	Cynthia Ismail and Siti N. Indriani, Researchers, su-re.co
17.30 – 18.00	Break-out room discussion Synergising planning and potential collaboration with all stakeholders.	Room 1&2: TIPPING+ Room 3&4: LANDMARC + IKI <i>Discussion: Synergising Indonesia Clean Energy Transition</i> <i>Discussion: Synergising Land Use Mitigation Technologies and Practices in Indonesia</i>
18.00 – 18.20	General Room: FGD Report and Discussion	Moderator, Cynthia and Indri
18.20 – 18.30	Closing statement	Each speaker



Appendix 2. List of Participants during The Event

No.	Institution	Participant
1.	Agroinsider	Patricia Lourenço
2.	BAPPENAS (Ministry of National Development Planning)	Irfan Darliazi
3.	BAPPENAS	Andianto Haryoko
4.	BMKG Silangit (Silangit Meteorological, Climatological, and Geophysical Agency)	Nasrol Adil
5.	BMKG Silangit	Melanthon Haloho
6.	BMKG Jembrana, Bali – Jembrana Meteorological, Climatological, and Geophysical Agency	Aminudin Al Roniri
7.	BMKG Jembrana, Bali – Jembrana Meteorological, Climatological, and Geophysical Agency	I Made Dwi Wiratmaja
8.	BMKG Jembrana, Bali – Jembrana Meteorological, Climatological, and Geophysical Agency	Heppy Febriana Abdi Bintari
9.	BMKG Jembrana, Bali – Jembrana Meteorological, Climatological, and Geophysical Agency	Wahyu Widodo Putranto
10.	BMKG Jembrana, Bali – Jembrana Meteorological, Climatological, and Geophysical Agency	Desy Puspitasari
11.	BMKG Jembrana, Bali – Jembrana Meteorological, Climatological, and Geophysical Agency	Nur Saïdah
12.	BMKG Sulawesi Selatan – South Sulawesi Meteorological, Climatological, and Geophysical Agency	Rakhmat Praselia
13.	BPPT – Agency for the Assessment and Application of Technology	Bagus Alif Firmandoko
14.	BPPT – Agency for the Assessment and Application of Technology	Astri Pertiwi
15.	BPPT – Agency for the Assessment and Application of Technology	Dovan Pujangga Asmara
16.	BPPT – Agency for the Assessment and Application of Technology	Fusia Mirda Yanti
17.	BPPT – Agency for the Assessment and Application of Technology	Intan Machiya
18.	BPPT – Agency for the Assessment and Application of Technology	Restu Nursaadah
19.	BPPT – Agency for the Assessment and Application of Technology	Winda Wulandari
20.	BPPT – Agency for the Assessment and Application of Technology	Yusnitati
21.	BPTP Bali – Balinese Agricultural Technology Assessment Center	Hadis Jayanti
22.	BPTP Bali – Balinese Agricultural Technology Assessment Center	I Nyoman Sugama



No.	Institution	Participant
23.	Cambridge Econometrics	Eva Alexandri
24.	CIAT	Thao Pham
25.	Coaction ID (Coaction Indonesia)	Adhi Triatmojo
26.	Coord. TIPPING+ (GCF)	J. David Tàbara
27.	DJEBTKE – Directorate General of New, Renewable Energy and Energy Conservation, Ministry of Energy and Mineral Resources	Abu Muhammad
28.	DJEBTKE	Ashri Uswatun Nisa
29.	DJEBTKE	Christian Bio
30.	DJEBTKE	Christian Hamonangan Sihotang
31.	DJEBTKE	Ahmad Faqih Mahalli
32.	DJEBTKE	Iryan
33.	DJEBTKE	Praptono
34.	DJEBTKE	Rizka Devriyani
35.	ELEMKA – PT Layanan Mutu Ketenagalistrikan	Dede Mulyawan
36.	Directorate of Bioenergy – MEMR	Trois Dilisusendi
37.	ESDM Bali (Bali Agency of Energy and Mineral Resources)	I Putu Eka Pratama Putra
38.	ESDM Bali	I Gusti Ngurah Rudyanto
39.	ESDM Bali	I Gusti Bagus Setyawan
40.	ESDM Banten (Banten Agency of Energy and Mineral Resources)	Maulana Malik
41.	ETHZ (Eidgenössische Technische Hochschule Zürich)	Moritz Laub
42.	GIZ (Gesellschaft für Internationale Zusammenarbeit) – German Corporation for International Cooperation	Ananda Putri Permatasari
43.	GIZ (Gesellschaft für Internationale Zusammenarbeit) – German Corporation for International Cooperation	Florian Herzog
44.	GIZ (Gesellschaft für Internationale Zusammenarbeit) – German Corporation for International Cooperation	Karl Segschneider
45.	GIZ (Gesellschaft für Internationale Zusammenarbeit) – German Corporation for International Cooperation	Muhammad Rizki
46.	IRES/METI – Indonesian Renewable Energy Society	Paul Butarbutar
47.	Iwatani.co	Yosuke
48.	JIN Climate & Sustainability - LANDMARC	Eise Spijker
49.	JIN Climate & Sustainability - LANDMARC	Malte Renz
50.	Green Montessori School	China Kemp
51.	Green Montessori School	Grace
52.	Green Montessori School	Isabella
53.	Green Montessori School	Katherine



No.	Institution	Participant
54.	Green Montessori School	Leo
55.	Green Montessori School	Rocco
56.	Green Montessori School	Taliya
57.	Indonesia Research Institute for Decarbonization (IRID)	Moekti Handajani Soejachmoen
58.	Institute for Development of Economics and Finance (INDEF)	Dinda Ayu Maharani
59.	Merah Putih Hijau Bali (MPH)	Putri Ghina Octaviani
60.	PLN – State Electricity Company	Melly Priliani
61.	PLN – State Electricity Company	Vini Charloth
62.	PPIPE BPPT (Center for Assessment of Process and Energy Industry, Agency for the Assessment and Application of Technology)	Irhan
63.	Indonesia Power	Anna Reani
64.	Indonesia Power	Brian Kalti Pranata
65.	Indonesia Power	Elza Febrianto
66.	Krakatau Steel	Fatkur Rahman
67.	su-re.co	Amanda Ramadhani
68.	su-re.co	Arvin Nanda
69.	su-re.co	Bambang Wisanggeni
70.	su-re.co	Cynthia Ismail
71.	su-re.co	Erina Oyama
72.	su-re.co	Fabian Wiropranoto
73.	su-re.co	Siti Indriani
74.	su-re.co	Kyla Langotsky
75.	su-re.co	Maya Pasthika
76.	su-re.co	Natasha Ikhsan
77.	su-re.co	Oktavianna Winda
78.	su-re.co	Sarah Wibisono
79.	su-re.co	Takeshi Takama
80.	TU Delft	David Ismangil
81.	TU Delft	Diana Mangalagiu
82.	Czech Academy of Sciences (UGN Czech)	Stanislav Martinat
83.	University of Piraeus Research Center	Zois Katiforis
84.		AWR Bidlit
85.		Dewi A
86.		IPJAYA
87.		Oka Adnyana

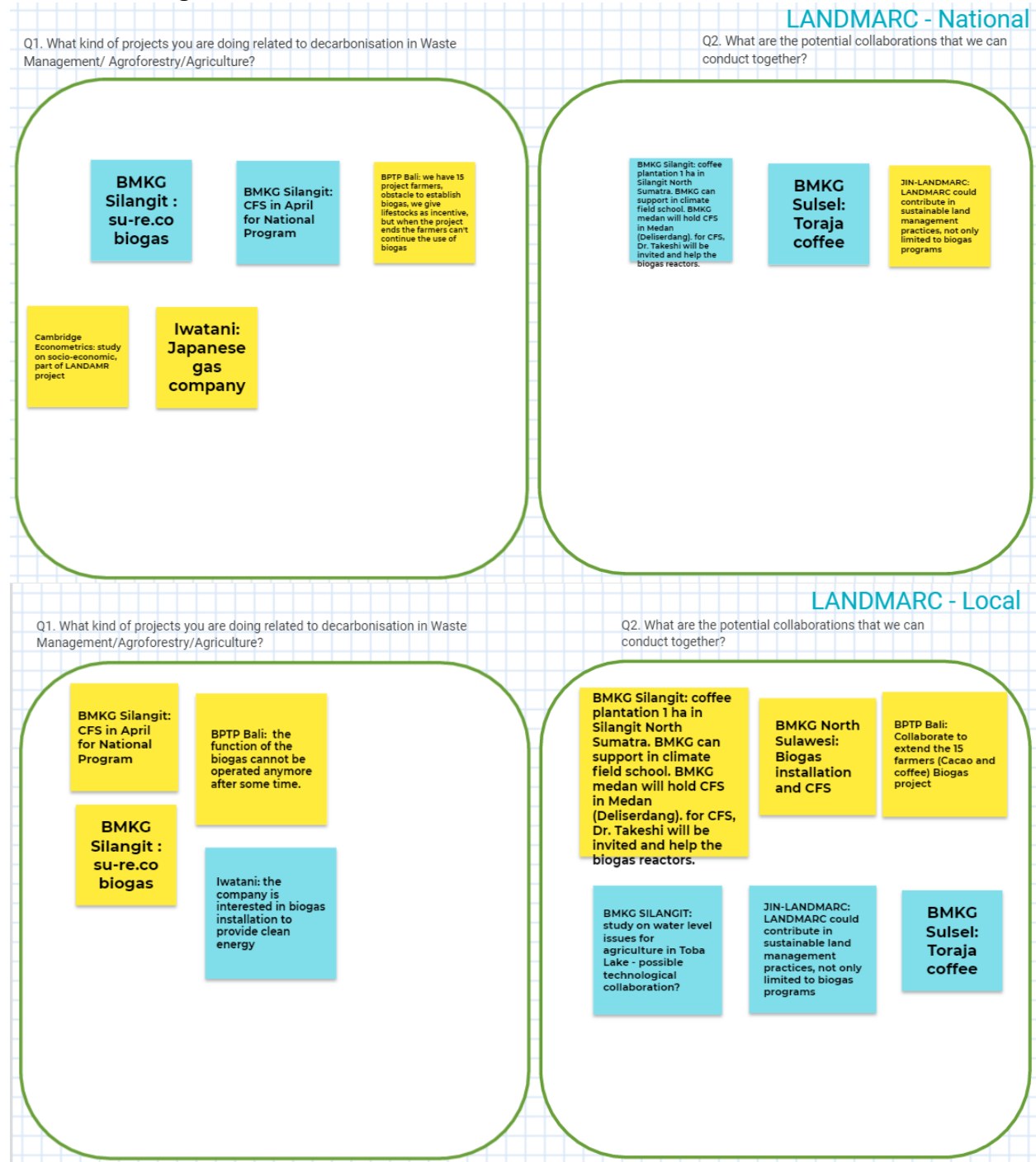


Appendix 3. Event Link

1. Zoom Link:

<https://us02web.zoom.us/j/81596754361?pwd=ZmkzR3VQcnUySDVqRitna01DRVlqdz09>

2. Notes during Break-out Discussion on LANDMARC in Indonesia



3. Notes during Break-out Discussion on TIPPING+ In Indonesia

ROOM 1 - TIPPING+

Q1. What are your current interventions to accelerate clean energy transition aligned with case study context?

Q2. What are the potential collaborations with your institutions aligned with TIPPING+?

Takeshi - Is PLN interested in this kind of project?

PLN - The project might be altered or revised, but must be aligned with the RUPTL. Depends on the grid

IP - Biogas since long time ago, but still in research stage. Need economical model for each region

IP - Current RE projects: Solar PV (residential); Wind power (NTT Province); Hydro; Biomass;

IP - Future: Hybrid RE, Geothermal, Biogas

IP - Possible to initiate cofiring with municipal waste

David - How can we quantify impacts (modelling) in order to focus on interventions with larger impacts?

Takeshi - Sureco might provide research data to support IP

David - How to diversify energy system stakeholders?



Appendix 4. Question and Answer Session

Session 1: Project Introduction

Q1: BPPT – Yusnitati

Yusnitati: *I have a question, should anybody can answer. What is the maximum coverage of funding for the 'government's institution? Say, we want to build a biogas reactor at the CPO plant for producing electricity or as co-firing. And should you need any source of funding from our side?*

Response (from Takeshi)
Is this about IKI Grant? We have the small grant from their huge grant. But specifically for this grant, the funding will depend on how much the organisation's annual income. Maybe others can answer? GIZ?

Yusnitati: *Currently, BPPT has the task of creating demo plans or big commercial plan in several industries, including CPO plants. We are building two biogas reactors, 1 for electricity (1 MW) and the other one is for co-firing (replacing fuels in the CPO plant which previously used palm shells and seeds, so they can now be sold instead). All of these are built by using government funds, but if we want to build another one, we have to find another funding source.*

So, is there any grant related to the carbon offset etc., so that we can build the project on another CPO plants? Biogas plants for liquid waste of palm oil are still a few in numbers in Indonesia

Response (from Florian)
IKI give grants to non-profits. It can be given to profit organisations; however, the project itself has to be non-profit. The grants depend on the size of the projects. You have to carefully read the funding conditions and make sure that the project is non-profit.

Q2: University of Oxford – Diana Mangalagiu

Diana: *It is interesting to see blockchain technology. There is growing criticism in the certification scheme, and the blockchain tech also comes with a carbon footprint (even though certification also has this). Are you taking this into account, and how you respond to that?*

Response (from Takeshi)
So, we use a closed one, not an open blockchain system. We are still not sure which one we will use. But we try not to use the ones used by the public. I understand your concerns regarding this issue. Simply put, we are still exploring the issue so that we can minimise the impact.

Response (from Florian)
Yes, we have to calculate the carbon offset from the blockchain system. I think the carbon calculation should be transparent and included in the overall carbon credit calculation.

Q3: Sugama – BPTP Bali



Sugama: *BPTP Bali has a few partner farmers who have already used biogas installations. One of them is on Desa Bukit with 15 units. Can we collaborate to widen the scale and revitalise the technology? So far, the use of biogas is not yet maximised.*

Response (from Takeshi)

Yeah, this is basically what happened in European Commission projects. There are some various issues, such as the use of the wrong incentive. We would like to hear more about why your project does not get maximised. It is possible for collaboration, and we want to talk more about it.

Q4: GIZ – Karl Segschneider

Karl: *There are a lot of potentials for a blockchain system. Are there any other pilot projects in other countries, or would the project be linked to other countries?*

Response (from Takeshi)

"It is a bit tricky because we personally 'do not have control over the project's scope. But technological transfer between countries can happen.

Response (from David)

There are a lot to learn from the other project, such as in South Africa. I can send the paper, and we can have further discussion. This tech is a very important technology and support investments from all over the world.

Response (from Florian)

We aim to fund the implementation of this project in the next two years. IKI Small Grants also aims to facilitate an exchange between key projects. Projects shall then also be presented to the wider public of IKI implementers and other organisations so that knowledge can be shared. We try to support exchange regarding best practice approaches between countries to facilitate later upscaling and out scaling of the promising project approaches.

Q5. su-re.co – Takeshi Takama

Takeshi: *How much do you think the certification costs? How can we actually reduce carbon offset? We keep talking about how expensive it is but never actually mention the number.*

Participants guessed through chat with the amount in the range of US\$ 25,000 – US\$ 250,000

Takeshi: *The initial cost for certification is 200 thousand Euros. But every year, they request 40 thousand euros. This is why we think it is expensive, especially for small projects. It might be possible for megaprojects, but it 'is not for small rural energy projects.*

Q6: Montessori – Chinakemp

Chinakemp: *How long do you plan to do what you do, like helping the climate? (for everyone)*



Response (from Takeshi)

The UN has the target of 2030. The problem is we cannot delay too long. There was a special report from IPCC, we have to have net-zero emission by 2050. But again, this is only a projection.

Response (from Malte)

I think we are all the researchers who are pretty convinced that we have to work for almost a full lifetime because it is an enormous problem. Hopefully, we can solve this problem by 2050, achieving net-zero emissions.

Response (from David)

We work every day, but we try to cut the work into small pieces; otherwise 'it is impossible. We tried to divide them into small tasks. Basically, we just try to continue working on what we can do without thinking too much for tomorrow.

Q7: Montessori - Isabella

Isabella: What can we do in everyday lives that can help the climate?

Response (from David)

I just want to say that the climate has no problem. We have a problem. Basically, the best thing we can do to help the climate is to face climate change. So, start with us and think of the climate as a human problem. And of course, we have lots of things we can do to reduce our energy consumption, food, etc. Think that the problem is in us, not out there.

Session 2: Policy Perspective on Clean Energy Transition and Land-Use Mitigation in Indonesia

Q1: BPTP Bali – Hadis

Hadis: There were three projects related to decarbonisation and renewable clean energy (TIPPING+, LANDMARC, and IKI Project).

How will these projects link all the participants and institutions because I saw a lot of institutions are involved? How will these projects link the policies from the government, for example?

On behalf of BPTP Bali (Bali Assessment Institute for Agricultural Technology), how we can contribute to this project?

For Fabian from the IKI Project, what is the benefit we might provide to the cacao and coffee farmers that we install biogas on-site? What can the benefit that the farmers get from the project?

Response (from Takeshi)

It is impossible to link all organisations and all policies. But the last project we could contribute to the national policymaking process, and we are keen to contribute to Bali's policy-making process as well. So, we would like to know how we can contribute. We cannot contribute to all, but we want to know which ones you need support from and which one you think our research project can contribute. Maybe we can discuss more on FGD; otherwise, we can keep in touch after the Workshop.

Response (from Fabian)

Basically, the biogas help the form of gas and organic fertiliser, but we want to do more because we want to include them in a circular economy scheme that provides them with clean energy and purchase their products and re-sell them on Bali and Japan. This entire scheme is to provide clean energy to farmers and involve as many social, economic and environmental impacts for them as possible to support them.

Hadis: thank you for your answers. I would like to continue next discussion with Mr. Takeshi. Until now, we also had a lot of conversations with Ms Indri and would like to continue it.

Q2: GCF – David

David: There is an increasing interest in linking biodiversity restoration and climate restoration. There is this new report by the United Nations on that topic called Making peace with nature report, which brings both the strands of thinking. And I think some of the examples you also mentioned today have this idea of putting some targets for restoration. Restoring life on earth is one of the key concepts in that report, and I think that your proposals are very much in line with that.

How do you see these two strands working in your company and policy/strategies?

How do you see the alignment of biodiversity restoration and climate strategies? How can you see the possibilities to upscale those strategies in your program?

Response (from Irfan)

Actually, that is what we want to see in our target in Indonesian strategy and action plan. We have planned on how to see the linkage of biodiversity with climate change. One of the issues is related to indicator because they are usually very specific in some places. However, we tried to make it a national-level indicator to see the impacts of policies related to biodiversity and climate change. This is one of the biggest challenges, linking biodiversity and climate change. But we have some ideas and definitely aim to figure out this link.

David: Yes, I agree. It is important to set the target. And it is usually difficult to monitor them.

Response (from Eise)

I heard a discussion about mangrove, and I was aware of this project already in Indonesia. So, I attached a link for the discussion. It is interesting how we have climate strategies through decarbonisation and, at the same time to preserve biodiversity. I think within the LANDMARC project, will see quite a lot of examples. There are interesting synergies to establish with specific land-based mitigation measures. It could be agroforestry or pit soil management. There is one example in the Netherlands where we have already set up a domestic carbon market. They are the first project for pit soil conservation that can generate carbon credits. This scheme is up and running, and they are also using some Earth observation



methods with satellites and groundwater level measurements to calculate how much carbon remains stored. And the main reason for buyers of those carbon credits to actually want to have is not so much of the carbon benefits but mainly because they are aware of the origins of the projects. It is local, and they highly value biodiversity gains. They are not necessarily quantified, but they know it is good for biodiversity

