DiBiCoo
Digital global Biogas Cooperation

Report on the stakeholder workshops

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DiBiCoo – Digital Global Biogas Cooperation
Grant Agreement N°857804

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Content

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List of Abbreviations

Abbreviation	
D	Deliverable
T	Task
SC	Steering Committee
LSW	Local Stakeholder Workshop
IDN	Indonesia
ARG	Argentina
RSA	Republic of South Africa
ETH	Ethiopia
RE	Renewable Energy

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List of Figures

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List of Tables

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Executive Summary

The Local Stakeholder Workshop (LSW) is one of the activities in the DiBiCoo program which is directly aimed at key stakeholders in the target countries. Two LSWs were targeted for each target country during the DiBiCoo project period. LSW was firstly initiated to introduce DiBiCoo and as a means to collect and validate the data needed for WP3 such as stakeholder mapping (T3.1), analysis of market conditions (T3.3), identification of local needs related to research and training topics including those related to financing (T3.4 & T3.4) and selecting potential applicants for demo/follower cases (T3.6). However, in practice, LSW has an important role which is not only its stance as one of the tasks in WP3 but also contributes to other WP. For WP2, LSWs have facilitated the sharing the European Biogas market, technologies, and policy/legal framework. In the second series of LSWs, almost every targeted country also took advantage of this moment to introduce a biogas matchmaking platform which is the output of WP4. Through LSW, in addition to the introduction of the platform, feedback and stakeholder contributions were also obtained, either by uploading their company profile, their business opportunity, or just as a visitor.

Due to the global Covid-19 pandemic, the implementation of DiBiCoo activities including LSWs has been delayed, thus causing tight schedule until the end of the project period. Consequently, Argentina was unable to hold the second LSW until the specified time. The existence of restrictions in the targeted country also required the partners to take mitigation measures, such as by considering changing the implementation format without reducing the expected substance—virtual and hybrid. Even though without the second event in Argentina, it did not nevertheless make LSWs unable to achieve its goals. LSWs were attended by more than 600 stakeholders—three times more than targeted—dominated by companies in the biogas sector and government. In terms of quality, the limitations of the implementation of LSWs were also able to identify the expected number of prospective demo/follower cases, as well as successfully provide a room for sharing and discussing local biogas issues, for example biogas upgrading product (biomethane), digestate utilization, and issues related to technology and financing that underline the urgency of having an integrated biogas matchmaking platform.

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DiBiCoo Project

The **Digital Global Biogas Cooperation (DiBiCoo)** project is part of the EU's Horizon 2020 Societal Challenge 'Secure, clean and efficient energy', under the call 'Market Uptake Support'.
The target importing emerging and developing countries are Argentina, Ethiopia, Ghana, South Africa and Indonesia. Additionally, the project involves partners from Germany, Austria, Belgium and Latvia. The project started in October 2019 with a 33 months-timeline and a budget of 3 Million Euros. It is implemented by the consortium and coordinated by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

The overall objective of the project is to prepare markets in developing and emerging countries for the import of sustainable biogas/biomethane technologies from Europe. DiBiCoo aims to mutually benefit importing and exporting countries through facilitating dialogue between European biogas industries and biogas stakeholders or developers from emerging and developing markets. The consortium works to advance knowledge transfer and experience sharing to improve local policies that allow increased market uptake by target countries. This will be facilitated through a digital matchmaking platform and classical capacity development mechanisms for improved networking, information sharing, and technical/financial competences. Furthermore, DiBiCoo will identify five demo cases up to investment stages in the 5 importing countries. Thus, the project will help mitigate GHG emissions and increase the share of global renewable energy generation. The project also contributes to the UN Sustainable Development Goals (SDG 7) for 'Affordable and clean energy", among others.

Further information can be found on the DiBiCoo website: www.dibicoo.org.

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1. Introduction

1.1 Local Stakeholder Discussion Workshops in DiBiCoo

The DiBiCoo project includes activities aiming to remove local governance barriers and to support development and implementation of sustainable energy policies and legislation – with a specific focus on biogas – in the 5 target countries Ghana, Ethiopia, South Africa, Indonesia, and Argentina. This is mainly achieved through the involvement of relevant stakeholders from the biogas sectors in those five countries. The Local Stakeholder Discussion Workshops conducted within the framework of DiBiCoo were targeted specifically at identifying and addressing various stakeholder groups from the public sector, the biogas industry as well as research institutes.

In each target country, a series of two Local Stakeholder Discussion Workshops (LSWs) had to be organised. The key objectives of those LSWs in the target countries spread in almost all other DiBiCoo work packages (WP): to introduce the DiBiCoo program, to provide lessons learned from European biogas development, to discuss about local market conditions, and barriers in the biogas sector, to introduce the Biogas and Gasification Matchmaking Platform, and especially to establish cooperation with stakeholders. In order to better understand the opportunities and constraints for biogas projects in the target countries, also a market analysis and an assessment of the framework conditions were performed and validated by the stakeholders in the course of the DiBiCoo project (see DiBiCoo_D3.3 Report on the biogas markets and frameworks in Argentina, Ethiopia, Ghana, Indonesia, and South Africa). This includes concrete facts on legislation, permitting procedures, financing, infrastructure, available expertise, but also soft conditions, such as social and cultural issues, as well as sustainability issues. The LSWs aimed – among other things – to get first input from relevant stakeholders in the five target countries on the market conditions and identify biogas stakeholders, to identify research and financing needs, and to identify concrete biogas project opportunities in the five target countries as preparation for the DiBiCoo Market Uptake Program in WP6; finally, the LSWs were targeted to inform and promote the DiBiCoo program as market support for selected Demo and Follower cases.

1.2 Evaluation of the Local Stakeholder Discussion Workshop

Covid-19 Pandemic

The workshop preparation in all target countries were kickstarted since late-January 2020, in which guidelines were distributed and the entire implementation process was coordinated by RDI. However, due to the limitation caused by the Covid-19 pandemic, the first workshop in Indonesia and South Africa, which were initially planned in 2020, were postponed. Meanwhile, the first LSW was ultimately conducted in 2020 in three other countries: Ethiopia (February 25, 2020), Ghana (February 28, 2020), and Argentina (March 10, 2020). In order to differentiate it from other knowledge transfer activities within the DiBiCoo project, the LSWs were designed to be the first step in introducing DiBiCoo, formally announcing the call for applications for the DiBiCoo Market Uptake Program and its demo case opportunities (as a preparation for WP 6) and collecting key local stakeholder's feedback on the current situation of biogas development

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in the respective countries as a basis for the upcoming Market and Framework Analysis (D3.3). In addition, the breakout session was required to increase interaction between participants and deepen the substance of the discussion by exchanging point of views in a more comfortable and intimate space.

The postponement of the first LSW in Indonesia and South Africa has impacted the promotion of DiBiCoo and interaction with local stakeholders in both countries, and thus hindered the implementation of T3.6 in identifying demo project opportunities, and also limiting data and information collection for the subsequent T3.3 Market and Framework Analysis. As a consequence, and to countermeasure this, Indonesia and South Africa conducted individual virtual meetings and sent out emails to the key stakeholders thereby introducing DiBiCoo and the upcoming DiBiCoo Market Uptake Program (WP 6) to catch up with the expected output of the first workshop. Contacts were also established online and the deadline for demo and follower case applications was postponed to reach a sufficient number of identified project opportunities. The difficulties in communications resulted in increased demand for communication and additional coordination efforts, thus more person-month had to be used.

Virtual/Hybrid Event and Concept Change

Along with the increasing prevalence of Covid-19 cases around the world throughout 2020, the continuation of the workshop series started again in early 2021. The event concept kept changing while continuously evaluating the pandemic situation. RDI as task coordinator carried out bilateral meetings with partners from target countries to get updated information regarding the Covid-19 situation and to discuss the possible implementation date and event format. The activities proposed in the LSWs to achieve the objective are at least one of the following:

a. Dissemination of biogas info and validate research result of:
    i. D 3.3 Market framework research results
    ii. D 3.4 Financing opportunities research results
    iii. D 2.2 European technology catalogue results
    iv. D 2.3 Export opportunities result
b. Provide best practices of policy/legal frameworks from other countries (D 2.4 European Legal, institutional, and political framework results)
c. Announce the Demo Case selection results and next collaboration steps (WP 6)
d. Promote the Biogas and Gasification Matchmaking Platform (WP 4 and 7)
e. Breakout session/ discussion/ panel session to maintain interaction and engagement with respective local stakeholders or between stakeholders in smaller group

The Covid-19 pandemic affected all WPs in DiBiCoo enormously, forcing partners to be really flexible and finding new ways and solutions to implement activities and events. Thus, more coordination and communication effort was needed. While some activities and events were successfully changed into the virtual mode, others had to be postponed. Six workshops have been held throughout 2021 despite the very challenging pandemic situation. Indonesia and South Africa decided to conduct both LSWs in virtual format, while the Covid-19 situation in Ghana and Ethiopia allowed them to have the second LSW in a hybrid format (Ghana) and respectively in a completely physical format (Ethiopia).

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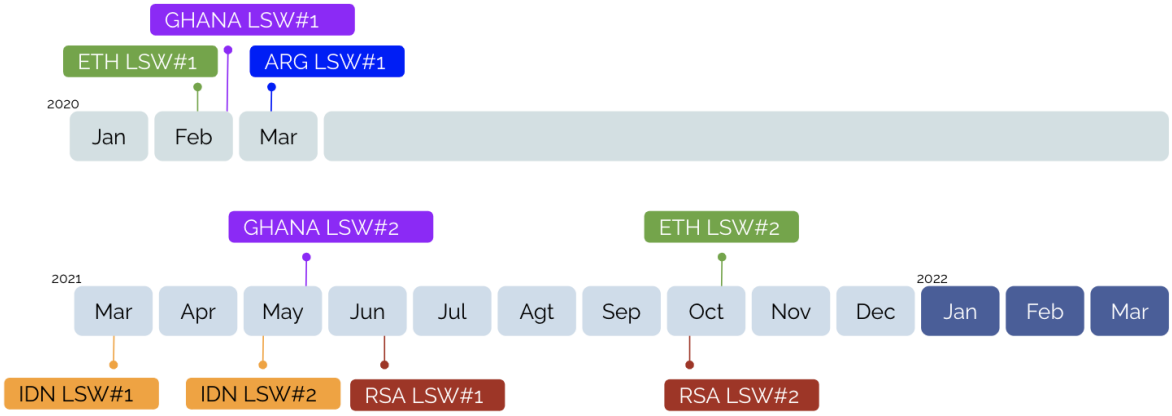

Figure 1. LSWs completion in importing countries

Unfortunately, the second LSW in Argentina could not be carried out until the time of submitting this deliverable. This is because LSW's schedule was shifted by other DiBiCoo activities in Argentina which had also to be postponed due to pandemic. However, this does not mean that the DiBiCoo' main objectives were not achieved. We have fully reached the target of relevant DiBiCoo KPI's where T3.2 Local Stakeholder Workshop can contribute to —in regard to number of participants and contribution to other WP— even without the second LSW in Argentina. The LSWs were not the only format in DiBiCoo to maintain the engagement with local stakeholders and other forms of conversations and discussions have been conducted during the DiBiCoo program period in Argentina instead. INTA as the Argentinian consortium partner has been active in presenting and promoting DiBiCoo activities to local stakeholders through other workshops such as the one hosted by Low Carbon Business Activity (LCBA) about Biogas: Challenges and Opportunities of the Application of Digestate in Argentina.

Number of participants

The first workshops in Ethiopia, Ghana, and Argentina in 2020 had each varied in terms of number of participants, categories of stakeholders presenting as key speakers, as well as topics presented on the panel session. The LSW in Ethiopia was attended by 19 participants, while in Ghana there were 48 participants and Argentina drew over 50 participants. From six workshops held throughout 2021, around more than 500 key stakeholders of Indonesia, Ghana, Ethiopia, and South Africa have attended. In terms of participation and inclusion, all the major stakeholders from within the biogas market including government representatives and policy makers, project developers from the private sector, as well as universities and research organizations were represented. Biogas project developers *(orange)* and representatives from government institutions *(light blue)* were the main group of participants (see Figure 2.). Simply said, DiBiCoo´s expected impact 3 (outreach to more than 75 policy makers in importing countries) was accomplished even with only nine workshops.

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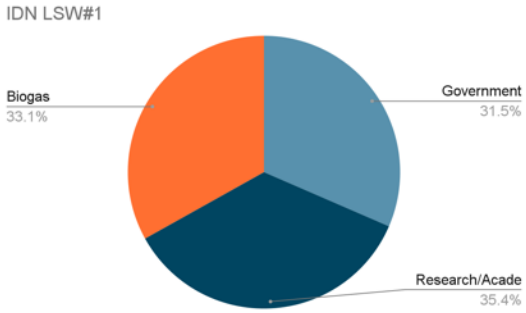

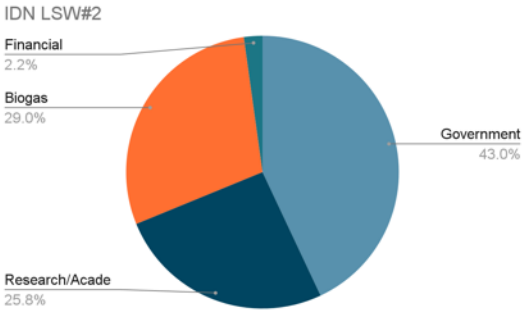

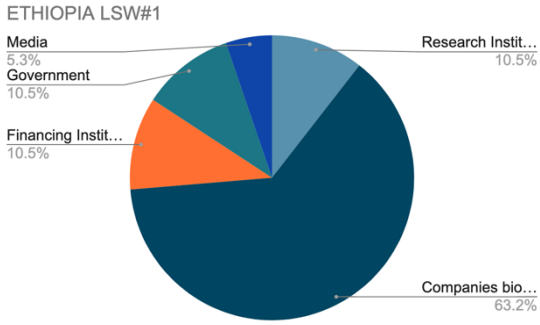

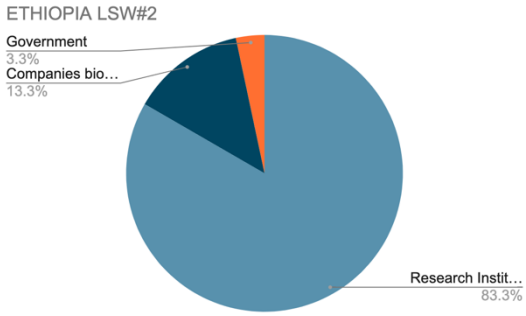

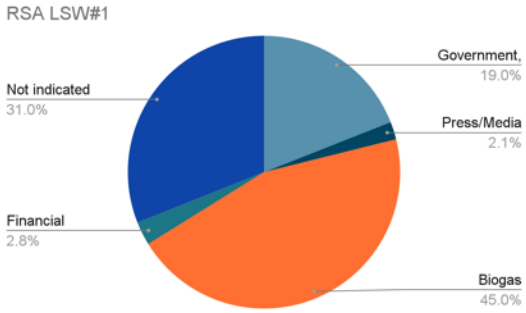

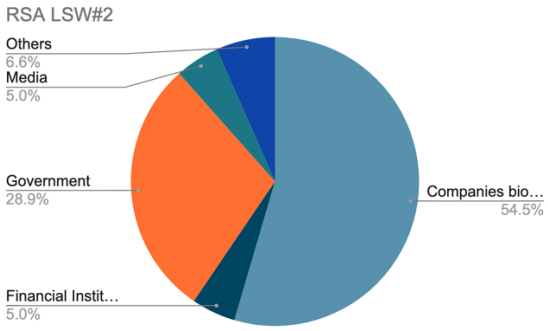

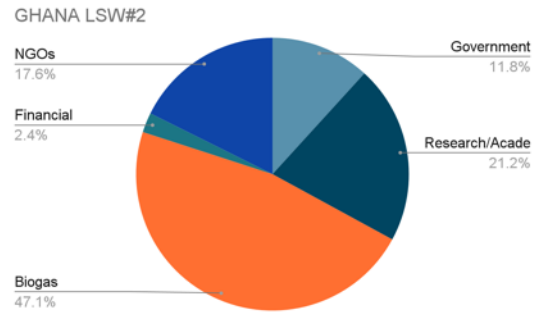

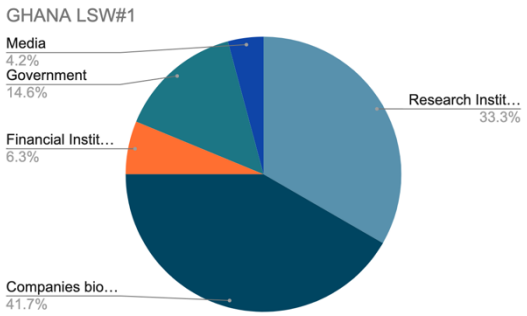

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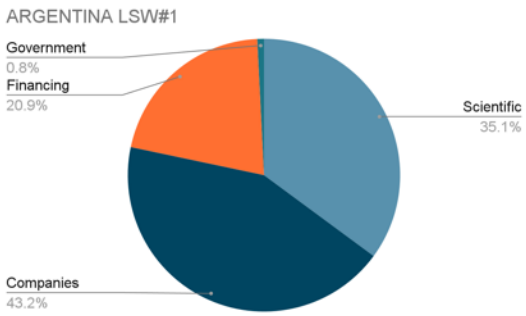

Figure 2. Structure of LSWs's participants

Moreover, although with the change in concept, it is clearly seen that the virtual and hybrid approach has allowed the event to reach even more attendees and a wider audience, thus allowing us to inform more stakeholders in the target countries. These were allowing attendance from any part of the country to join by providing such a flexible event. Figure 2 shows that there is an increase in the number of participants in the second LSW in Ghana and even though both LSWs in Indonesia were implemented virtually, the interest of participants in the events did not decrease.

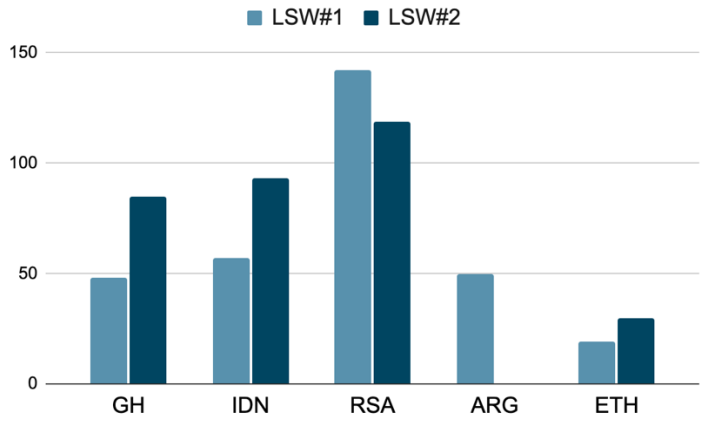

Figure 3. Number of participants of LSWs in importing countries

In addition to other topics, biogas policies from Europe have been shared and key steps as lessons learned were concluded. For example, in the second LSW of Indonesia, the discussion focused on the prospect and challenges of biomethane in Indonesia and shared how the biomethane development in Europe was influenced by the government policy and strong commitment on maximizing their biomethane potential. Government and financial institutions have showed their commitment to support biogas sectors in the workshops like in Ghana, where even the Director of Renewable Energy of the Ministry of Energy expressed his commitment to support the development of regulations for the Biogas sector during the LSWs there and PFAN Ghana (Private Financial Advisory Network) also reiterated their readiness and willingness to support companies with good proposals and indicated that they will be happy to consider DiBiCoo project developers to apply for the funds (see also the news article here Energy Ministry to develop regulatory framework for biogas industry - DiBiCoo). No less

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important, the second LSW in Ethiopia had succeeded as a way to introduce the Biogas and Gasification Matchmaking Platform and encourage local stakeholders to explore the platform as several discussion points were raised among the participants especially on how to use the digital matching platform effectively for Ethiopian biogas opportunities.

In sum, the Local Stakeholder Discussion Workshops have been very successful in getting relevant stakeholders from the five target countries of DiBiCoo on board and in informing them about the potential of biogas as a waste treatment and energy generation technology for emerging markets. A total of more than 600 stakeholders participated in the conducted 9 workshops and were thus informed about DiBiCoo and the Market Uptake Program. This exceeds the expected number from the GA of 200 participants in total. The stakeholders´ input and expertise collected during the LSWs was taken up in the subsequent Market and Framework Analysis (D3.3), as well as the Report on Financing Opportunities (D3.4). Project proposals from participants were received and were considered to potentially become DiBiCoo Demo or Follower Cases (T3.6) within the scope of the Market Uptake Program (WP 6). Thanks to the effort of all DiBiCoo consortium partners and the many countermeasures taken (e.g., additional individual meetings with stakeholders) the obstacles for this task faced due to the Covid-19 pandemic were overcome. Thus, even though only 9 out of 10 workshops were conducted, all objectives from T3.2 were achieved successfully.

Table 1: Contribution of LSWs to other WP

Importing countries	**WP2**	**WP3**			**WP4**	**WP6**	**WP7**
	Sharing European biogas market, technologies, and policy/legal frameworks	*Group Discussion: Collect and validate data for deliverables in WP 3 - D3.3 (biogas market); D3.4 (financing opportunities); D3.5 (training needs, including barriers and challenges)*			*Present the Matchmaking Platform; collect information needed for the development; ask for stakeholder needs on this and possibly get user feedback on the platform*	*Attract potential applicants for demo and follower cases; contact with demo and follower cases*	*Introduction to DiBiCoo and promote upcoming project activities*
		D3.3	**D3.4**	**D3.5**			
Indonesia							
LSW 1	✓	✓		✓	✓		✓
LSW 2	✓	✓		✓			✓
South Africa							
LSW 1		✓	✓		✓		✓
LSW 2			✓				
Argentina							
LSW 1		✓	✓	✓		✓	✓
LSW 2							
Ethiopia							

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LSW 1		✓	✓	✓		✓	✓
LSW 2					✓	✓	✓
Ghana							
LSW 1		✓	✓	✓		✓	✓
LSW 2	✓				✓	✓	✓

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2. Ethiopia

2.1 First Local Stakeholder Workshop

2.1.1 Workshop Program / Agenda

Digital global Biogas Cooperation Workshop Program
Venue: Mado Hotel, Near Atlas, Addis Ababa
Date: February 25, 2020

Table 2. Agenda of the first LSW in Ethiopia

Time Slot	Event	Organizer/Presenter
8:30 AM - 9:00 AM	Registration of Participant	Iceaddis
9:00 AM - 9:10 AM	Presentation of Program	Sinshaw Alemu, Iceaddis
9:10 AM - 9:15 AM	Opening Speech	Markos Lemma, CEO, Iceaddis
9:15 AM - 9:35 AM	Overview of the National Biogas Project Presentation	Ministry of Water, Irrigation & Electricity/SNV
9:35 AM - 10:15 AM	Presentation on DiBiCoo Project	Sinshaw Alemu, Iceaddis
10:15 AM - 10:35 AM	Tea Break	
10:35 AM - 11:35 AM	Panel Discussion	Plenary
11:35 AM - 12:00 PM	Biogas in SA: Lessons	GreenCape, SouthAfrica
12:00 PM - 1:00 PM	Lunch break	
1:00 PM - 1:30 PM	Briefing on Break- out sessions	Iceaddis/RDI/GreenCape
1:30 PM - 3:00 PM	Break Out Session: - Discussion theme 1: Collaboration and Alignment with DiBiCoo - 'Demo Case' business Model Development	Groups
3:00 PM - 3:20 PM	Tea break	
3:20 PM - 4:00 PM	Presentation by group representatives	Group Representatives

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4:00 PM - 4:30 PM	Key next Steps: Stakeholder Mapping and Demo Case Applications	Iceaddis/RDI/GreenCape
4:30 PM	Closing	Iceaddis/RDI/GreenCape

2.1.2 Participant List

The local stakeholder workshop was attended by 19 external participants.

Table 3. External Participants of the first LSW in Ethiopia

No	Name	Affiliation
1.	WB	AAU
2.	MH	Blue Flame Biogas
3.	KN	ECCA
4.	SD	BAM Media
5.	AG	Metal & Wood Work
6.	EA	Ministry of Agriculture
7.	MT	SNV
8.	ED	Ministry of Finance
9.	AS	Private
10.	NS	Private
11.	MY	Development Bank of Ethiopia
12.	GM	NBPCU
13.	MD	YO TECH
14.	YO	YO TECH
15.	ES	Detail Ethiopia
16.	AS	EL Recycle
17.	ES	Development Bank of Ethiopia
18.	AB	Researcher on Biogas
19.	AB	Private

2.1.3 Presented Materials

These are the materials that were presented at the February 25, 2020 DiBiCoo workshop in Addis Ababa, Ethiopia. Presentation materials given in the workshop can be accessed in: (Presentation)

2.1.4 Notable Highlight of the Workshop

2.1.4.1 Presentation / Panel Discussion Session

The DiBiCoo workshop in Ethiopia had a speaker from SNV, Ato Melis presenting about the National Biogas Programme of Ethiopia (NBPE). He addressed important topics such as functions of NBPE and the sector´s approach to developm biogas in Ethiopia. Sinshaw from

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Iceaddis also presented/ introduced the DiBiCoo project to the stakeholders and discussed how stakeholders and national biogas projects can benefit/collaborate on the project. In addition, GreenCape from South Africa highlighted the South African experience in the biogas industry. Finally, RDI also briefed on DiBiCoo stakeholder survey activities.

Feedback/Highlights

- Suitable Model for a relatively unmatured biogas market (Addis Ababa University): given the early stage of the biogas market in Ethiopia; the Business Model designed must be incentivised in terms of, for example, cheaper energy costs; catering small scale capacity and users.
- Potential clients for the Demo Cases (Addis Ababa University): institutional companies like the big beverage companies (e.g. Coca Cola; Heneken Breweries; etc) produce sufficient feedstock and could be convinced to develop mid to large size biogas projects where they can use the energy themselves. This could be reached out individually. Universities; Shared public housing; Dairy Farms; Abattoirs; etc are also alternatives. City municipality as a key waste handler must also be consulted.
- Waste Management is an issue: the municipality is responsible for waste management in urban centres. However, standard waste management systems are far behind in Ethiopia and emphasis must be given for this component on the value chain.

Question and Answer

- Size of Demo Case: 1MW is considered a bit of an outlier compared to what is considered ‘large’ size in Ethiopia. Interested applicants were encouraged to apply even if their project is not that big. GreenCape also added to mind measuring size on digestate volume and energy equivalent, which are not always directly related.

Highlights of Presentation by Development Bank of Ethiopia

- There are two major financing sources currently available for businesses working in the RE sector
  - Core Bank Financing: the bank is required by the Government (in this case the Ministry of Water, Irrigation and Electricity) to allocate a share for each energy sector. Given companies submit a good feasibility study; they can unlock large loans. Loan disbursement target of the government is currently: 35% Off-grid and 65% grid based.
  - World Bank RE Funds: The World Bank, through IFC, has availed close to $40 Mio. to be loaned through the development bank of Ethiopia for Renewable Energy suppliers and also for Micro Finance Institutions to loan farmers using RE. However, most of this funding is redirected to Solar (PV) technology suppliers as the bank doesn't/hasn't received applications from Biogas developers.
- Challenges: Foreign Exchange is a grave national challenge in Ethiopia right now.

2.1.4.2 Group Session

The following are the results of discussion from each of the breakout groups: Notes of the group session discussion can be accessed via: *(Group Discussions Notes)*

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Discussion Theme 1: **Collaboration and Alignment with DiBiCoo**
(Spend 10 minutes discussing each question)

1. Based on initial cooperation in the presentation; discuss how the DiBiCoo project could better support you or your institution from the perspective of three key stakeholders: **Private Developers/Suppliers**; **Public/Donor Programs**; **Financing institutions**
2. How and in which particular area could the DiBiCoo better support the **NBPE+?**
3. The role of the Private Sector in the Ethiopian biogas industry has been less than ideal. What sort of support and model should be put in place, for the **private sector to lead the sector,** as in the case for other RE sources (e.g., Solar)?
4. **Discussion on the DiBiCoo Online Information System instead** (e.g., what kind of information should be provided on the platform & would be helpful to you? What type of matchmaking would be useful? What other requirements do you have regarding such an online platform? Etc.)

Figure 4. Presentation session of the first LSW in Ethiopia

Discussion Theme 2: **Demo Case Business Model – High Level Planning**
(Spend 10 minutes discussing each question)

1. What market opportunities are available in the country for biogas development, and what is the most potential feedstock sector for the Demo Case development? (MSW, agriculture, sanitation, etc.)
2. Who could be the lead implementer for the Demo Cases?
   a. Discuss the availability of institutions/private developers suitable for the Demo Cases given the target technical specifications.
   b. Recommend specific potential developers and locations (please also consider geographical areas that are economically and socially attractive for bioenergy development)
3. Discuss financing options and key requirements for successful financing schemes
4. Discuss Key implementation Challenges/Concerns on the Demo Cases and propose Mitigation Strategies.

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Figure 5. Discussion session of the first LSW in Ethiopia

2.1.5 Workshop Evaluation

2.1.5.1 What went well

- Speakers of the Workshop delivered materials suitable for DiBiCoo: The representative from the National Biogas Program Coordination Unit Ethiopia delivered a presentation on the National Biogas Programme of Ethiopia (NBPE) which aligns with the DiBiCoo program objectives, the NBPE+ (2017-2022) program may serve as an opportunity for DiBiCoo to support through the implementation of the demo case and follower projects
- Ideal representation of the three key stakeholder groups: Public Ministry/Development Partners; Private Developers and suppliers; Financing institutions (Development Bank of Ethiopia - one of the largest development financiers
- Good representation of potential private developers who have already shown interest to collaborate
- Brief presentation from the Development Bank of Ethiopia on available financial products and schemes
- Received a good idea on the stage where the Ethiopian sector is and the dynamics planning
- Identifying our basic objectives, issues to address and the stakeholders we prioritise as critical to DiBiCoo.

2.1.5.2 Points need improving

- More stakeholders could attend although the workshop had an ideal representation; not everyone invited came to the workshop.
- Not all participants of the group session are actively engaging in the discussion: cultural and language barriers have hindered group members during the breakout session from openly voicing their opinions, the discussion is centred around senior group members that are more respected, and younger (but not necessarily less experienced group members) are participating less in the discussions. In the future, workshop organizers should officially appoint facilitators in each breakout group.

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2.2 Second Local Stakeholder Workshop

2.2.1 Workshop Program / Agenda

Venue: Iceaddis conference Hall, Addis Ababa, Ethiopia
Date: October 28, 2021

Objective: the second local stakeholder discussion workshop of the DiBiCoo project aims to assess progress of the key interventions and activities under implementation of DiBiCoo in Ethiopia, for a year and half. In particular, the workshop introduces the Digital Biogas and Gasification Matchmaking Platform and presents progress of the demo and follower biogas project cases by developers and project staff.

Table 4. Agenda of the second LSW in Ethiopia

Session	Presenter/ Responsible	Timeline
Opening Remarks	Dr. Wondwossen Bogale	9.30 - 9.35 AM
DiBiCoo Project Progress (with Q&A)	Sinshaw Alemu DiBiCoo Project Lea, iceaddis	9.35 – 10.30AM
Q&A	Sinshaw/Wondwossen	10.10 - 10.30 AM
Coffee Break (10.30 AM – 11.00 AM)		
Digital Matchmaking Platform	Aleksejs Zacepins, Latvia Life Science University	11.00 AM – 12:00 PM
Discussion on the Digital Matchmaking Platform	Aleksejs Zacepins/Wondwossen/Sinshaw	12.00 – 12.30 PM
Lunch: 12:30 – 2:00 PM (Organizers)		
Developing commercial Biogas: Demo Case and Follower cases	Dr. Wondwossen Bogale DiBiCoo Technical Lead, Iceaddis	2.00 – 2.40 PM
Developing commercial Biogas: Demo Case project from Ethiopia: Biogas from Water Hyacinth	Dr. Nega Tassie	2.40 – 3.10 PM
Developing commercial Biogas: Follower case: Biogas from Ethiopian Airlines waste	Ethiopian Airlines	3.10 – 3.30 PM
Discussion	Wondwossen/Sinshaw	3.00 - 3.30 PM
Coffee Break (3.30 PM – 4.00 PM)		
Developing commercial Biogas: Follower case: Biogas from Debrebirhane Municipal Waste	Dr. Alemnew Berhanu	4:00 - 4:30 PM

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Discussions and the Way forward	Sinshaw/Wodwossen	4.30 PM – 4.50 PM
Concluding Remarks	Sinshaw Alemu	4.50 - 5 PM

2.2.2 List of participants

Table 5. Participants of the Second Local Stakeholder Workshop

No	Name	Organization
1	DT	Ethiopian Rural Energy Development and Promotion Centre (EREDPC)
2	AA	Addis Ababa Institute of Technology (AAiT)
3	HG	Addis Ababa Institute of Technology (AAiT), Renewable Energy
4	AB	Ethiopian Environment and Forest Research Institute (EEFRI)
5	TT	Ethiopian Airlines
6	MT	Addis Ababa Institute of Technology (AAiT), Renewable Energy
7	AT	Ministry of Water, Irrigation and Energy (MOWIE/EREDPC)
8	HS	senstronics
9	ET	Addis Ababa Institute of Technology (AAiT)
10	AN	Addis Ababa Institute of Technology (AAiT), Thermal Engineering
11	FM	Addis Ababa Institute of Technology (AAiT)
12	MA	Addis Ababa Institute of Technology (AAiT), Thermal Engineering
13	SA	iceaddis
14	TD	YOTECH
15	WB	Addis Ababa Institute of Technology (AAiT)
16	BS	Ethiopian Environment and Forest Research Institute (EEFRI)
17	YT	Ethiopian Rural Energy Development and Promotion Centre (EREDPC)
18	TB	Addis Ababa Institute of Technology (AAiT), Thermal Engineering
19	BG	Debre Birhan University Researcher
20	AB	Debre Birhan University Researcher
21	YB	Ethiopian Environment and Forest Research Institute (EEFRI)
22	MT	Urban Farming
23	TT	Ethiopian Environment and Forest Research Institute (EEFRI)
24	GJ	Ethiopian Environment and Forest Research Institute (EEFRI)
25	BT	Ethiopian Institute of Architecture, Building Construction and City Development (EiABC)
26	YB	Debre Birhan University, Researcher
27	GA	Addis Ababa University
28	YS	Addis Ababa University
29	BLC	Biogas Expert, Institute of Agricultural Engineering, University of Hohenheim
30	PM	Professor Biogas, University of Fort Hare, South Africa

2.2.3 Presented Materials

Speakers' presentations can be accessed: https://bit.ly/ETHworkshoppresentations

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2.2.4 Points of discussion

Several discussion points were raised among the participants especially on how to use the digital matching platform effectively for Ethiopian case. Besides that, the discussion focused also on the demo case and follower cases of Ethiopia. The presenters elaborated and shared their experience in detail followed by other participants who added their experiences. In general, the participants got detailed insights into DiBiCoo and the Matchmaking Platform.

Figure 6. Participants of the second LSW in Ethiopia

2.2.5 Workshop Evaluation

2.2.5.1 What went well

The participants for the first LSW were actively engaged as the topics selected were timely and crucial for the biogas stakeholders in Ethiopia. The LSW created a knowledge hub between biogas experts, policy makers in the energy sector, private sector stakeholders, and several financial institutions in Ethiopia. Currently the biogas stakeholders are much known and are supporting each other.

2.2.5.2 Points need improving

The existence of discussion and networking activities among biogas experts in Ethiopia is undoubtfully necessary. In addition to private developers and researchers, it is also important to always bring policy makers, therefore, not only the technical aspects of biogas are covered but also how the interest and needs of developers and support programs from DiBiCoo could be aligned with current policies and targets for national RE development targets. Furthermore, discussion models such as breakout rooms and/or world café methods can be added to the next workshop concept so that discussions are built not only through Q&A with speakers.

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3. Indonesia

3.1 First Local Stakeholder Workshop

3.1.1 Workshop Program / Agenda

RDI-DiBiCoo Biogas Workshop#1: Lessons learned from biogas development in the emerging economies
Date: 18 March 2020
Time: 03:30 – 06:30 PM
Venue: Zoom online platform

Figure 7. Promotional tools of LSW#1 in Indonesia

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Table 6. External Participants of the first LSW in Indonesia

Time	Activity	Responsible person(s)/Presenter
Introduction		
15:20-15:30	Pre-event registration	Zoom, Operator
15:30-15:35	Introduction to seminar	Moderator
15:35-15:40	Welcoming remarks 1	Andriah Feby Misna (Director of Bioenergy, Ministry of Energy and Mineral Resources Indonesia)
15:40-15:45	Welcoming remarks 2	Johannes Anhorn (DiBiCoo Coordinator)
Operator takes photo led by **Moderator**		Moderator, Operator
Presentation		
15:50-16:10	Biogas Development in Indonesia	M Abdul Kholiq, Chairman of Indonesia Biogas Association
16:15-16:35	Lessons Learned from Biogas Development in Malaysia	Raymond Cheah, Chief Operating Officer-Green Lagoon Technology, Malaysia
16:40-17:00	Thailand Biogas Progress Clean Energy with Sustainability at Heart	Pruk Anggarangsi, Director-Energy Research and Development Institute, Chiang Mai University Thailand
17:05-17:25	Lesson Learned from Biogas Development in the Emerging Economies-Argentina	Jorge Hilbert, MS.c., Biogas Expert-Rural Engineering Institute (INTA) Argentina
17:30-17:50	Introduction to DiBiCoo Matchmaking Platform	Aleksejs Zacepins and Vitalijs Komashilovs, Latvia University of Life Science and Technology (LLU)
Move to break out room		
18.00-18:15	Break out room session	Facilitator
Back to main workshop room		
18:15-18:25	Conclusion and closing statement from speakers	Moderator, speakers
Closing		
18:25-18:30	Closing	Moderator

3.1.2 Participants list

Out of more than 150 registrants, there were more than 70 participants who attended the workshop in the Zoom call and 289 watched the live streaming on RDI YouTube channel. However, there were only 57 participants who were willing to fill the attendance form, as follows:

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Table 7. Indonesia's participants list

No	Full Name	Institution
1	JM	North Sumatera University
2	NV	PT Krakatau Daya Listrik
3	AD	RDI
4	AAPS	PT. Sungai Bungur Indo Perkasa
5	AF	PT. Sungai Bungur Indo Perkasa
6	AS	BII4U Consultant
7	EP	PT KDL
8	RY	Andalas University
9	IPD	Direktorat Jenderal EBTKE, Kementerian ESDM
10	TKY	Green Lagoon Technology Sdn Bhd
11	RR	Agency for the Assessment and Application of Technology
12	EDM	SMP Negeri 42 Rejang Lebong
13	MLY	NASIONAL MOJOSARI VOCATIONAL HIGH SCHOOL
14	OYS	University of Nottingham Malaysia
15	SNH	Teraju Klasik Sdn Bhd
16	HZ	Linköping University
17	AZ	Universitas Bakrie
18	FFBN	Rypen Timor - Lorosa'e
19	JPKS	Bandung Institute of Technology
20	MLN	Regional Infrastructure Development Agency MPWH Indonesia
21	KM	RDI Intern
22	ASD	PT Pasadena Biofuels Mandiri
23	FT	Sebigas Renewable Energy srl
24	HSR	PT LAPI ITB
25	SW	Practitioners
26	MN	Trakindo
27	SSP	PT Sarana Multi Infrastruktur (Persero)
28	MAK	Center for Environmental Technology at the Agency for the Assessment and Application of Technology
29	FG	Andalas University
30	AMH	IPB University
31	MA	Syiah Kuala University
32	MT	BPPT
33	RBP	Universitas Muhammadiyah Purwokerto
34	HZ	Bahir Dar University
35	TM	LIPI
36	TS	STTIF
37	HY	PFAN
38	BS	UNION Instruments GmbH
39	AK	Trakindo Utama

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40	FAF	Secretariat General of Energy National Council
41	HM	SIAP SIAGA PALLADIUM
42	MA	Tegal Regency
43	DP	STKIP Cokroaminoto Pinrang
44	ER	Universitas Muhammadiyah Jakarta
45	RCS	Czech University of Life Sciences
46	TS	GIZ - ExploRE
47	TSY	BPPT
48	US	Government of Tangerang Regency
49	YRH	University of Muhammadiyah Purwokerto
50	AK	ESDM Sumatera Utara
51	BB	Medco Energi Int
52	AS	Institut Sains dan Teknologi Al Kamal
53	LA	Consultant
54	WAB	SMART
55	AS	LIPI
56	TM	LIPI
57	TS	STTIF Bogor

3.1.3 Presented Materials

Presentation materials can be accessed in: http://bit.ly/BiogasWorkshop1_Materials_-Presentation

3.1.4 Notable highlight of the Workshop

3.1.4.1 Presentation / Panel Discussion Session

As part of the DiBiCoo project, RDI continued its effort to spread knowledge about biogas by holding a workshop on 18th March 2021. The workshop raised a topic of lessons learned from biogas development in the emerging economies. The event aimed to facilitate a discussion on regulatory framework, financing scheme, operation and maintenance, and other details of biogas development according to various experiences in the global south. In total, six speakers with various and extensive experience in biogas development presented during the workshop.

The first presentation was delivered by Dr.-Ing. M. Abdul Kholiq, MSc, a Chairman of ABGI, and Director of Centre for Environmental Technology, Agency for the Assessment and Application of Technology (BPPT), Indonesia. He highlighted that small and medium biogas plants are distributed in 31 provinces in Indonesia, with a total of 47,5 thousand plants, but still lower compared to China (42 thousand) and India (65 thousand). He also explained that the first biogas upgrading and bioCNG production in Indonesia is located in Kalimantan, with capacity of up to 1.000 Nm3/hr. For future developments, he suggested the importance of further developing co-digestion (to increase biogas production and the production ability with effective pre-treatment methods), biogas upgrading, and use of digestate as liquid fertilizer. Infrastructure for BioCNG production already exists in Indonesia, mostly developed by Pertamina.

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The second presentation was delivered by Raymond Cheah, a Chief Operating Officer of Green Lagoon Technology, Malaysia. He mentioned that palm oil is obviously the main focus for biogas development in Malaysia, producing 434 palm oil mills from 5.74 million hectares of palm oil plantation. He also reflected that there are a lot of questions regarding the possibility of making the palm oil industry sustainable. However, he ensured that in December 2018 an article from National Geographic Magazine concluded that palm oil is not going away any time soon, particularly because palm uses half the land to produce the same amount of oil compared to other crops. He updated that currently there are 29 Green Lagoon Technology (GLT) projects in Peninsular Malaysia and Indonesia to show the significance of the lagoon technological development progress for biogas production.

The third presentation was delivered by Pruk Anggarangsi, Ph.D., a Director of Energy Research and Development Institute, Chiang Mai University (CMU), Thailand. He highlighted that starting from the 1990s the Thai government has worked with sugar factories, agro-industries, etc. in biogas R&D. He explained that the current hot topic in biogas development is the community power plant. Thailand is following Germany's footsteps by working with the farmers to develop their own biogas plants. He added that this year there have been collaborations between farmers and investors to get the power plant development approved. He emphasized that the local development of biogas in Thailand should be able to support the people in the area. He also mentioned that the CMU has approached institutions in Malaysia, Indonesia, etc. to further collaborate in biogas technology development.

The fourth presentation was delivered by Jorge Hilbert, a biogas expert of Rural Engineering Institute (INTA), Argentina. He explained that the last government administration has promoted several biogas plants in various provinces in Argentina. Most of these plants adopt European biogas production technology. From 2016 to 2019, 52 new biogas plants have been developed, with 6 plants already in operation, 32 in recovery, and 14 new ones still in implementation stages. He showed that some of the plants were constructed with the concept of a circular economy, one of the examples is the Minidest modular farm bioethanol plant. It produces approximately 5000 L of ethanol for transportation and other uses. There are also around 3.000 animals providing feedstocks for biogas production, while the digestates are used for corn production. The inclusion of the biogas plants in the bioethanol plant evidently increases the bioethanol production performance. He also presented that farmers adopt biogas systems in numerous ways, including cooperative systems, the association of groups of farmers investing in the agro-industrial transformation of grains, project developers, and even independent big farmers. He added that currently government actions are still concentrated in immediate relief to the poorest sectors of the population, therefore promoting difficulties in implementations of these technologies.

The last presentation was delivered by Aleksejs Zacepins and Vitalijs Komashilovs, experts from Latvia University of Life Sciences and Technologies (LLU). Different from the other presenters who talked about their experience in biogas development in their own countries, the last two presenters introduced a digital information system that could be used by biogas stakeholders, namely the DiBiCoo Biogas and Gasification Matchmaking Platform. They explained that their main task is to provide a digital platform to facilitate convenient matchmaking between actors of exporting and importing markets for biogas technologies. They presented the development process of the platform. They developed the platform through an iterative and agile process. The platform is also open to the public and available for

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everyone. The authenticated users will have some personalized features in the platform compared to anonymous users.

After the presentation, all participants had a chance to further discuss the challenge and how to improve the biogas development. During the workshop, all participants were actively engaged in discussion and enthusiastic with the topic. The workshop was launched by Trois Dilisusendi, a representative of Bioenergy Directorate, Ministry of Energy and Mineral Resources of Republic of Indonesia and Dr. Johannes Anhorn from GIZ.

3.1.4.2 Discussion in chat box

During the workshop, all participants were encouraged to put their questions into a chat box so that speakers can respond. The correspondence in the chat box, as follows:

Table 8. Q&A Discussions in Indonesia's workshop

1.	Q - Elisabeth Rianawati: I'm interested in the raise of 1.6% of electricity fee, is this compulsory for all citizens? A - Raymond Cheah: 1.6% compulsory for ALL electricity users
2.	Q - Elisabeth Rianawati: There are quite a few biogas development projects in Malaysia, mostly relying on covered lagoons or is there another type of technology used? A - Raymond Cheah: mostly we use lagoon type because it is less CAPEX and although I don't have the accurate info, it is generally accepted that lagoon has lower OPEX as well
3.	Q - Elisabeth Rianawati: You talk about utilization of biomethane, so how to solve the problem of transporting the biomethane for factories that are far from the grid/ pipeline? A - Raymond Cheah: Transportation by trucks has been utilized by the one and only bio-CNG plant in Malaysia so far. Two projects to inject into the pipeline are being constructed right now. Unfortunately, we do not have any other records in Malaysia.
4.	Q - Dr. Johannes Anhorn (GIZ): you mention the valuable contribution from Europe/Germany in delivering technology. On the contrary German Technology is often considered expensive, how would you describe the benefits of those technologies? A - Pruk: From our experience, German equipment is very high quality and, in some applications, we opted to invest in. In general cases, investors in Thailand do not buy turnkey plants from Europe but opt to use local engineering and use crucial equipment which cannot be produced locally. Also, the biogas system designed for Southeast Asia should be significantly more cost- and climate- suitable to the area.
5.	Q - Dr. Johannes Anhorn (GIZ): How much would you rate the contribution of Biogas (plants) in Thailand to the national economy? A - Pruk: In terms of percentage to countries GDP, may be too little to account for. But as Thailand is a food producer country, a responsible production through proper waste management helps with country competitiveness and carbon neutral goal.
6.	Q - Hari Yuwono PFAN: Mr. Pruk, How competitive is the price of the biogas system implemented in the campus in comparison to another commercial biogas? Please assume the same capacity. A - Pruk: The biogas plant on our campus is 600m3 Dry Anaerobic system, the construction cost is approximately 650,000 USD (not including the garbage sorting system) It is designed to handle solid waste with a lot of material contaminations (ie. No pumping possible, only screw conveyor transport) so it can be quite more expensive per m3 than wastewater biogas at the same size. We offer a 600m3 farm

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	wastewater biogas starting from 100,000 USD in Thailand.
7.	Q - AmirSOE-BII4U Consultant: I heard you mention solar panels, what is your opinion about the investment cost between solar panels compared to biogas? A - Pruk: In Thailand, Solar investment is no. 1 priority in terms of the low price of installation and ease of maintenance. As I mentioned Solar PV only produces when the sun shines and whenever the sun shines, the energy is basically 'free'. On the other hand, biogas investment always must have a common benefit with waste treatment or farmers revenue generation. So, biogas creates a larger impact. Therefore, I suggest we should not compare between the two but integrate them together.
8.	Q - Regawa Bayu Pamungkas-Universitas Muhammadiyah Purwokerto: One of the important things in biogas production is the rate of reaction of the biogas formation. Mr. Pruk, would you please share information on how to accelerate the rate of reaction in formation of biogas? A - Pruk: If we focus on a typical lagoon type wastewater biogas system, the two main disadvantages are No temperature control and No Mixing. Both are difficult for lagoon type digesters; this is where the CSTR system are becoming more popular as it increases the level of control to the system and thus increase efficiency.
9.	Q - Elisabeth Rianawati: Pak Abdul, what is your insight of the most promising biogas development in Indonesia, LNG / bio-cng /electricity? or another type of utilization? A - M. Abdul Kholiq (BPPT/ABgI): Selling electricity from biogas is now facing some difficulties. Biogas sources are normally in a remote area far from the electricity grid. There is also a surplus of electricity in some areas of Indonesia (especially in Java). So, ABgI and other stakeholders are trying to find and promote alternatives, such as co firing in biomass-based boilers, so the palm kernel shell can be sold to other users (e.g., for co firing of coal based power plant/PLTU). Another possibility is to upgrade the biogas to get bioCH4/BioCNG which can be utilized as an alternative to CNG. These are for large scale biogas plants. For small scale biogas plant, we can utilize the biogas for cooking, heating, drying of agricultural products etc.

3.1.4.3 Presentation / Panel Discussion Session

In this session, all participants were divided into three rooms. In each room, a facilitator and speakers facilitate a discussion on two questions, as follows:

1. What is the main barrier for biogas development in the emerging economies?
2. How to address the barrier of biogas development in the emerging economies?

Based on the notes from the three rooms, we can summarize that the discussions lead a similar pattern of answers. For the first questions, the three rooms agree that policy, technology and knowledge, and financial aspects are still among challenges for the development of biogas. For the second question, the three rooms highlight the role of policy, financial institutions, and technological development if we want to address the barrier. Most notably, the discussions emphasized the importance of the government to create a competitive energy market to raise private investment in renewable energy.

3.1.4.4 Closing remarks

Closing remarks were given by all speakers:

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1. Dr. Abdul Kholiq: The biogas potential in Indonesia is very large. We need more effort to promote biogas technology across the country. We face several problems and challenges, but we are optimistic that the biogas development will be very good and similar to those in European countries.
2. Raymond Cheah: A lot of the time, conversations to bankers and investors regarding investments in biogas development tend to be very difficult. They may have ways of looking into things. We should give more efforts to convince these investors to "listen" more about the potential of this field.
3. Pruk Aggarangsi: I think biogas technology is quite well developed. I would not call it easy, but it is about time we adopted it and of course the financial aspect is very important. If possible, the organizer should be able to "educate" the banks.
4. Jorge Hilbert: The challenges we have now to incorporate the biogas framework to the country's national strategy are currently being addressed in international collaborations to get a broader view of the industry and promote the potential further. I agree that we now have a very mature technology from all around the world to offer to industries. I look forward to joining the efforts to synergize the movement all around the world.
5. Aleksejs & Vitalis: We hope that the DiBiCoo project in developing the digital platform really helps participants in exploring and promoting biogas developments in emerging countries.

3.1.5 Workshop Evaluation

3.1.5.1 What went well

In terms of participation and inclusion, all the major stakeholders in the biogas industry including government, private sectors, university and research organizations, project developers were represented. Unfortunately, there were no financial institutions coming to the event, although invitations have been disseminated to them. The representative of the Ministry of Energy and Mineral Resources and GIZ made an opening remark for the workshop.

In terms of timing, we could begin and end the workshop on time. All speakers and moderators attended the workshop punctually. Before the workshop and at the beginning of the workshop, all speakers have interacted with each other under our facilitation, so they have discussed what materials that they should prepare for their presentation. This is effective to synchronize the presentations of all speakers and to improve their understanding on the topic and the objective of the workshop.

In terms of speakers and participants interactions, we can observe an active discussion between participants and speakers in the chat box. Moreover, discussion was continued in the breakout room session. However, we must admit that the coverage of the active discussion did not involve all participants. While some participants were actively engaged in discussion, some others tended to just listen to the discussion.

3.1.5.2 Points needs improving

It is revealed through some discussions that financial institutions have been reluctant to join seminars on renewable energy since it has not become a topic of their interest. Therefore,

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there should be strategic action to improve awareness of financial institutions on clean energy development and their critical role in realizing the agenda.

To improve the rate of participants to actively engage in discussion, we could have given a more specific question that relates to their background and interest. However, we also cannot deny the limitation of having an online workshop with a large number of participants to create an active discussion. One option to address this is by extending the duration for break out room sessions. Break out room sessions could cut the number of participants in a room. Therefore, we could expect them to become more active. In this workshop, the duration for the breakout room session was only 15 minutes. For future events, we would suggest making it at least 30 minutes.

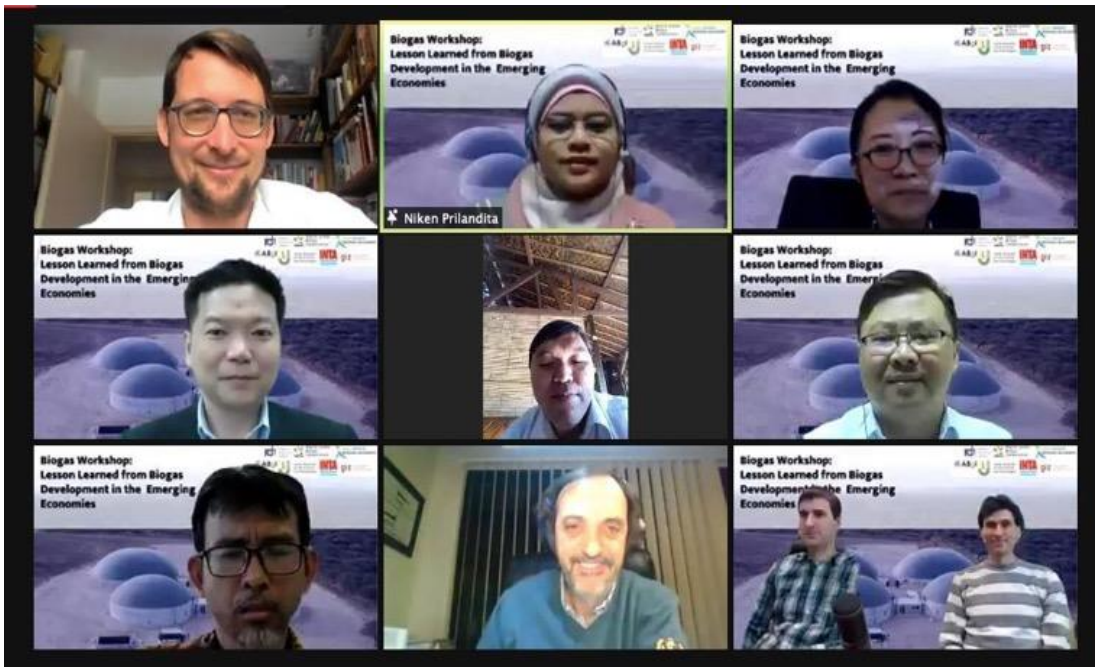

Figure 8. The first virtual LSW in Indonesia

3.2 Second Local Stakeholder Workshop

3.2.1 Workshop Program / Agenda

RDI-DiBiCoo Biogas Workshop#2 Accelerating Bio-methane Utilization in Indonesia: Lesson Learned from European Countries
Date: 7 May 2020
Time: 03:00 – 05:00 PM Jakarta Time
Venue: Zoom online platform

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Figure 9. Promotional tools of LSW#2 in Indonesia

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Table 9. External Participants of the second LSW in Indonesia

Time	Activity	Responsible person(s)/Presenter
14:50-15:00	Pre-event registration	Zoom Host
15:00-15:05	Introduction to the event	Moderator
Presentation Sessions		
15:05-15:25	Sessions 1: Projection for the bio-CNG market in Indonesia	Andriah Feby Misna – Director of Directorate of Bioenergy, Ministry of of Energy and Mineral Resources
15:25-15:40	Discussant feedback by Windri Aji Brata - Energy and Sustainability Specialist at PT SMART Tbk	
15:45-16:05	Session 2: BIO-CNG uses and policy support: success stories and lessons learned from Europe	Harmen Dekker, Director of European Biogas Association (EBA)
16:10-16:30	Session 3: Best practice Experience of Bio-methane utilization in Germany	Alexey Mozgovoy, Business Development Manager International Biomethane at PlanET Biogastechnik
16:30-16:45	Discussant feedback by Franz Kirchmeyr - Kompost & Biogas Verband Österreich (AKBOE)	
Q&A Sessions		
16:50-17:10	Q&A session	Moderator
Closing		
17:10-17:15	Wrap up	Moderator

3.2.2 Participants list

Out of 190 registrants, there were 90 participants who attended the workshop in the Zoom call and 185 watched the live streaming on RDI YouTube channel. However, there were only 88 participants who were willing to fill the attendance form, as follows:

Table 10. Participants list of Indonesia's Second Local Stakeholder Workshop

No	Full Name	Institution/Organisation
1	AR	Sahid Jakarta University
2	ASR	Winrock International
3	AG	Direktorat Bioenergi, ESDM
4	AS	BPPT
5	ALD	RDI
6	ALS	Universitas Pertamina
7	MMF	Eaton Industries
8	AK	PT. Euroasiatic jaya
9	AFM	Ministry of Energy and Mineral Resources
10	ASD	PT Pasadena Biofuels Mandiri
11	AF	BPPT
12	AI	PPSDM KEBTKE
13	BPAS	PT Hutama Karya (Persero) EPC Division
14	BPK	RDI
15	GB	PT Wijaya Karya (Persero)

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16	CS	GREE Energy
17	DDKS	Wijaya Karya
18	MAFK	Universitas Pertamina
19	DK	PT KALTIMEX ENERGY
20	AR	PT. Elmoz Geo Solusi
21	EM	Direktorat Bioenergi , MEMR
22	BP	Direktorat Bioenergi , MEMR
23	EW	PPSDM KEBTKE
24	ALE	FROGS INDONESIA
25	FA	Wageningen University
26	MFH	PT Syntek Otomasi Indonesia
27	FS	BPPT
28	FDR	Setjen DEN
29	FAF	Setjen DEN
30	GL	RDI
31	GAR	KESDM
32	HA	PT. SMART Tbk
33	HS	BPPT
34	HAA	Institut Teknologi Bandung
35	MIA	Universitas Pertamina
36	IHR	Multico
37	IF	external auditor
38	MIN	DLH Kab. Sanggau
39	JB	HOMEBIOGAS - ECO VERDE SOLUTIONS PTE LTD.
40	JCH	PT TRAKINDO UTAMA
41	JS	PT Great Giant Pineapple
42	BH	Energy and Mineral Resources East Kalimantan Government
43	KF	Dinas ESDM Jawa Tengah
44	KAS	Kementerian ESDM
45	FK	Austrian Compost & Biogas Association
46	GSL	Asia Pacific Natural Gas Vehicles Association (ANGVA)
47	LARP	PT Perkebunan Nusantara III (Persero)
48	SM	POLITEKNIK PERTANIAN NEGERI PANGKEP
49	MAVK	University of Southampton
50	MN	Wisma Jerman/EKONID
51	MR	EBTKE
52	MAK	BPPT
53	AN	PT Elmoz Geo Solusi
54	NV	PT Krakatau Daya Listrik
55	NS	BPPT
56	NV	BPPT
57	PA	WIKA
58	PR	BPPT
59	RS	PT Kaltim Prima Coal
60	HNN	WIKA
61	RW	DSL
62	RCS	Czech University of Life Sciences Prague
63	RMN	KemenPUPR
64	RMR	Universitas Pertamina
65	RP	PT Perkebunan Nusantara V
66	RD	Direktorat Bioenergi , MEMR
67	RR	BPPT

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68	SSR	PT Perkebunan Nusantara III
69	AIS	Universitas Sebelas Maret
70	SP	PT Dharma Satya Nusantara Tbk
71	SB	Rumah ilham
72	SWN	Dinas esdm prov kaltim
73	SEP	Biotrix Asia
74	SY	UNS
75	MS	DSNG
76	YT	PT. Pasadena Biofuel Mandiri
77	EM	Direktorat Bioenergi , MEMR
78	TS	BPPT
79	TJH	PT Riset Perkebunan Nusantara
80	TD	Direktorat Bioenergi , MEMR
81	TPS	GIZ - ExploRE
82	WW	BPPT
83	WAB	PT SMART
84	DW	Practitioner
85	BBC	PT AIUEO Kreasi Energi
86	YH	PT Intidaya Agrolestari
87	HY	PFAN
88	ZM	PT Eaton Industries

3.2.3 Participants list

Presentations materials can be accessed in: http://bit.ly/Materials_WorkshopSeries2

3.2.4 Notable Highlights of the Workshop

3.2.4.1 Presentations/Panel Discussion Session

Several efforts to achieve carbon neutrality have been tried such as increasing energy efficiency, EV, coal co-firing, and deploying biogas. The development of biogas processing and purification technology has opened new opportunities in maximizing its utilisation. Biomethane with its multi beneficials, is one of the biggest technologies that is within reach and as solution in reducing emission. In acknowledgement of all of the points stipulated above, Resilience Development Initiative (RDI) held The DiBiCoo Local Workshop Series #2 with the topic of "***Accelerating Bio-Methane Utilization in Indonesia: Lesson Learned from European Countries***", on May 7th, 2021 via the Zoom Platform.

By involving biogas industry players in Indonesia, especially in the field of biogas processing, this workshop aimed to discuss how DiBiCoo can contribute to the acceleration of biomethane utilization in Indonesia. This event invited few experts in this field such as Andriah Feby Misna which a Director of Renewable Energy from the Ministry of Energy and Mineral Resources, Harmen Dekker as the Director of the European Biogas Association (EBA), and Alexey Mozgovoy as a Business Development Manager International Biomethane at PlanET Biogastechnik. This event also was supported by few discussants namely Windri Aji Brata as an Energy and Sustainability Specialist at PT SMART Tbk and Discussant: Franz Kirchmeyr from Kompost & Biogas Verband Österreich (AKBOE).

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The first presentation was delivered by Andriah Feby Misna, Director of Renewable Energy from the Ministry of Energy and Mineral Resources. She presented the prospect and challenges of biomethane in Indonesia. From the technical side, biomethane in Indonesia still has not been commercialized widely. Indonesia needs some assessments and pilot projects to make sure what kind of business is necessary to develop, including the price and the cost. Responding to what Andriah has highlighted, Windri Aji Brata added that biomethane from palm-oil is supposed to be competitive with fossil fuels (LPG/diesel fuel), especially in rural/remote areas in terms of accessibility and lower price. So, the challenges lie in the utilization and how to find markets to absorb the produced biomethane.

Coming from a European perspective in biomethane utilization, the second presenter, Harmen Dekker has made it clear that biogas is unique as it is at the heart of green development. Biogas tackles a lot of the problems at the same time and no other renewable energy could do that. Don't focus on the specific technology like bio-LNG, focus on the production of biogas first, and distribution channel is the next issue. It is just a matter of timing. In addition, Alexey Mozgovoy from PlanET Biogastechnik brought the specific case of Germany. He concluded that the growth of biomethane plants instalment depends very much on the incentives given by the government. Not only highlighting the biomethane production and biomethane plant instalment but also how to bring the biomethane to the consumers. It won't be an easy task for Indonesia's government, but he did believe it is achievable with the amount of biowastes available. Linking back to the terms of biomethane as a form of biogas upgrading, Franz Kirchmeyr added that in Europe, the term 'upgrading' is to apply the biomethane and feed it to the gas-grid connection while in other countries it is more about the purification. Upgrading biogas has huge variations in the application techniques and so many countries need to have to be clear & aware about the situation they faced in maximizing their biomethane potential according to what they need.

3.2.4.2 Panel Discussion

During the workshop, there were panel discussions between all speakers and discussants and all participants were also encouraged to put their questions into a chat box or directly asked by opening their microphones.

PANEL DISCUSSION
Q-Windri Aji Brata: There are still challenges aside from the agriculture waste potentials (palm-oil, tapioca, agriculture solid wastes); financing access, technology, and coordination. Focusing on the supplier side of bio-methane from palm-oil, the product is competitive with fossil fuels (LPG/diesel fuel), especially in rural/remote areas (in terms of accessibility and lower price). But the challenges lie in the utilization and how to find markets to absorb the produced bio-methane. The easiest option of course is to nearest cities, but how could the government (EBTKE-ESDM) support in socializing/increasing awareness of industries or even the public about the market and utilization of bio-methane? **A-Andriah Feby Misna**: By holding webinars series related to Bio-CNG massively to support development and educate the public about the market potentials of Bio-CNG (namely bio-

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share). However, the logistics (packaging) itself is still difficult, such as bottling and the distribution method.

O-Windri Aji Brata: The Governments could collaborate with gas networks (private companies and state-owned companies). It can also be an alternative solution for such problems.

Q-Harmen Dekker: In Indonesia, fossil fuels are still being subsidized. Alternative energy (solar & wind) are also supported. Is there any idea to subsidize Biomethane, just to accelerate the biomethane production?

A-Andriah Feby Misna: It's quite difficult this time to say whether there is subsidy for biomethane or not, because the regulation itself has not been there yet. We need to have some assessment of the cost and benefits of Biomethane to be able to say that biomethane can be subsidised, this process needs to be discussed with the Ministry of Finance since the subsidy's matter is not the domain of the Ministry of Energy. But again, the opportunity is there and we have to make sure that the benefit of biomethane will be higher than the production cost.

Q-Abdul Kholiq: Can we also try such as the green fund?

A-Andriah Feby Misna: That's possible. The cost is still competitive, we need to find other schemes to deliver the product with a competitive price compared to fossil fuels.

O-Franz Kickmeyr: The first common misunderstanding; In Europe the term 'upgrading' is to apply the biomethane and feed it to the gas-grid connection while in other countries it is more about the purification. The second big misunderstanding, what does it mean by CBG (Compressed Biogas) for the transport sector, but from Indonesia it can also be bottled and used for cooking & heating appliances. We have huge variation in the application techniques and so we have to be clear & aware about the situation we faced.

QUESTIONS & ANSWERS

Q: how to store the biomethane without high pressure for example by absorbing the biomethane (adsorb the impurities by nanoporous materials)?

A: Franz Kirchmeyr - Akboe Additional note. In Europe we are using seasonal storage, because energy supply & demand varies and it depends on the season.

A: Windri Aji Brata - PT Smart - Challenges of distribution due to infrastructure development in Indonesia (such as in the remote area), solutions include bottling at high pressure (200 bar) and gas pipeline and LNG.

A: Franz Kirchmeyr - Akboe Using a biogas-grid in low-pressure level, but it depends on the capacity of the plant and the application technique which is used.

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A: Harmen Dekker - ABE - We can turn the table around, one factor that prohibits this uptake is because diesel prices are high due to the transport channels in rural areas. But, a lot of cases diesel and fossil fuel prices are low due to subsidies given. For example in Malaysia, Bio CNG is used by the industry sector, and this demand will be increasing (especially for international companies). Two propositions for Indonesian government. First, since money always has been and will be the problem, it will be better if the government set an obligation for every palm oil mill to have a biogas plant. This solution will save 10-20% GHG emission annually, and it doesn't cost any money for the government. Secondly, ensure that the industry & transport sector by year could increase the amount of target on uptaking bio-methane.

A: Alexey Mozgovoy - PlanET Biogastechnik - Agree with Harmen. Don't forget sustainability requirements, for example Indonesia's producers of palm oil. Sustainability must be considered, it means that reducing GHG emissions from the production supply chain at every point is important. Additionally, usage of palm oil residues from the production process can be considered.

Q: Irhan - BPPT - this bio-CNG obligations are still limited for private usage of diesel and not for commercial scale. In transportation fuel usage, there are no supporting trade system regulations. By following the existing regulation, the CNG selling price limit is 3000 rupiah/litre which is not profitable so it is difficult to compete with CNG from fossils. How is the government's support to overcome this issue and problem?

A: Feby - ESDM - We have no specific regulation on bio-methane utilisation, we need some assessments and pilot projects to make sure what kind of business we need to develop, including the price and the cost.

A: Windri - PT SMART (comment to Harmen's proposition) - It will be great if the government set an obligatory policy for palm oil producers, but from the private sector's perspective, it will increase our expenses and become a burden for us. In Indonesia cases it will be difficult, we need to find financial benefits from building biogas plants. It is different from the European market, there are a lot of incentives there. But overall, I do agree that targets must be set, and the implementation must be realistic (step by step).

A: Harmen dekker - EBA - Indonesian Government has a big task, biogas could enable a 10-20% emission reduction and not all countries could do this. Second issue is from the demand side, Europe has an increasing demand from the industry sector. Indonesian government has the option to subsidise biomethane, so that the subsidy for fossil fuel can be reduced.

Q: Ricardo - CULS - What can we learn from the context of European in convincing users to adopt Biogas as resources of energy? Did you face rejection and what did you do to change the user behavior? For Indonesian context, the driver for adoption of Biogas is mostly driven from industry, palm oil, milk production etc.

A: Alexey - PlanET Biogastechnik - In Germany, it is a different context due to the increasing diesel fuel prices in some islands so biogas can be a good substitution. Another

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context is the Feed in Tariff (FiT) and government targets from European Union that must be fulfilled.

Q: Setyo - PT DSN - Liquified bio-CNG is an ideal way to distribute bio-CNG, but cryogenic technology is very expensive. Do you have any solution in terms of bio-CNG distribution?

A: Alexey - PlanET Biogastechnik - There are solutions even for the market for southeast asia. Focusing on compressing is a much mature technology compared to liquefaction. It is better to compromise with the current situation in a specific country, and focus more on the effectiveness so the technology can fit to the market.

Q: Helen - PT SMART - Biogas plants are mostly decentralized so that the capacities are relatively small. On the other hand, the investment cost for Bio-LNG is still high. How to support the Bio-LNG deployment so that the target as stated in your presentation can be achieved?

A: Herman - EBA - Don't focus on the specific technology like bio-LNG, focus on the production of biogas first in total for every plant. Distribution channel is the next issue to be focused on. Today, bio-LNG is expensive, but over the years, maritime sectors will demand more from bio-LNG since they need to greenify their shipping fleet. It is just a matter of timing and distribution channel.

A: Franc Kirchmeyr - AKBOE - Take into account CO2 taxes, it will come up to all nations. We can not avoid this new market of carbon trading & taxes.

A: Alexey - PlanET - Indonesian government needs to install & support biogas & biomethane production. It won't be an easy task, but I do believe that with that amount of biowastes in Indonesia, it is achievable to save GHG with small inventions to accelerate the biogas and biomethane industry.

3.2.5 Workshop Evaluation

3.2.5.1 What went well

As for the timing, we could begin and end the workshop on time. The second workshop succeeded in presenting interesting topics that attracted the attention of many biogas stakeholders including government institutions, project developers, university and research organizations. This was because discussion and engagement with key stakeholders has been conducted prior to the event to determine workshops topics that matched what the stakeholders needed. By maximizing the mail list of participants attended in previous events and RDI as well as speaker's networking, the promotional tool has been widely conveyed and managed to get 190 registrants not only from Indonesia but also Austria, Germany, Spain, and Italy. In terms of participation, 43% of total participants attended were from government institutions, 29% from project developers, 26% from research institutions, and only the remaining came from financing institutions.

Since the workshop included panel discussions, there was a coordination meeting with all speakers, discussants, and the moderator a week before the event. In this meeting, the

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speakers discussed what materials that they should prepare for their presentation and how to synchronize questions and discussion in panel sessions. Moreover, technical rehearsal was also carried out two days in advance of the event by Zoom organizers from RDI staff together with moderator, speakers, and discussants. This test-run was proven to be effective to prevent miss-coordination within the workshop's flow.

To overcome the language barrier between speakers and participants, the RDI Zoom platform has been upgraded to facilitate the Indonesia interpretation feature and all English-speakers/presenters were very cooperative with interpreters assigned in delivering their materials slowly and with clear pronunciations. Active interactions between participants with speakers were triggered with insightful feedback from discussants in each panel session. The discussants were able to highlight the points that have been explained by the speakers and complement the materials with more practical context thus providing a clearer understanding for the participants.

3.2.5.2 Points need improving

The initiation of the workshop came out very close to the event date. Even though desirable speakers managed to find time to present in this workshop as well as to prepare the materials, this case was not applied for the assigned moderator. Because of the limited preparation time, some moderator candidates could not take the time for this workshop opportunity. The delay in getting moderator confirmation has affected the process of preparing and distributing promotional tools. The next event must be prepared as much as possible in the ideal preparation time.

The activeness of participants in the discussion or Q&A sessions was still lacking. Participants were not confident to ask questions directly or via chat box in English even though the moderator has invited participants to ask questions in Indonesian and would facilitate the translation. Although the interpretation feature has been activated, this was still less able to encourage the participants to be active in discussion. Therefore, interactive virtual discussion platforms or applications can be utilized instead of placing the questions in the chat box for example Kahoot, Mentimeter, etc. Throwing questions to the participants in the form of quiz, polling, or brainstorming can be some options to increase attendants' participation, collect their opinions, and generate more favourable discussions within limited duration.

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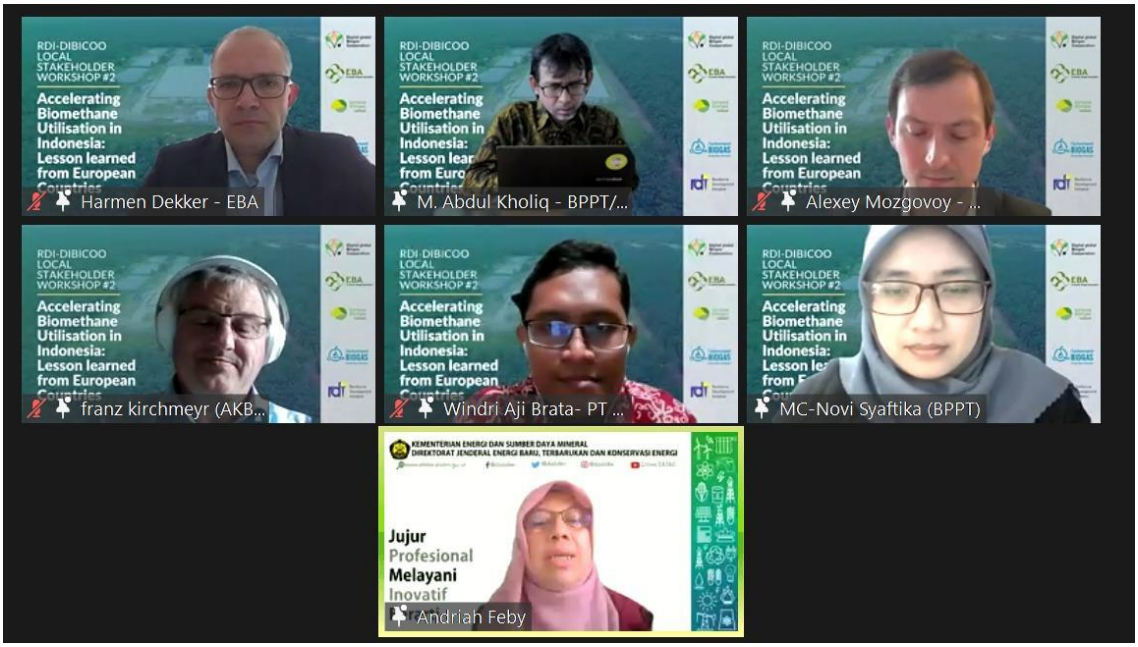

Figure 10. The second virtual LSW in Indonesia

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4. Ghana

4.1 First Local Stakeholder Workshop

4.1.1 Workshop Program / Agenda

DiBiCoo – Inception & Stakeholder Workshop - Ghana
Theme: Driving Sustainable Markets for the Biogas/Biomethane Industry between Europe and Developing Countries (Ghana)
Date: 28 February 2020; Time: 8:30 – 16:30
Venue: Ange Hill Hotel, East Legon, Near Emmanuel Eye Clinic, Accra

Table 11. External Participants of the first LSW in Ghana

TIME	AGENDA	SPEAKER(S)
	Friday, February 28, 2020	
8:30-9:00	Registration	*Committee*
9:00-9:10	Opening	*MC*
9:10-9:15	Welcome Remarks	*Lovans Owusu-Takyi*
9:15-9:25	Opening Remarks	*RDI*
9:25-9:35	Opening Remarks	*Ministry of Energy*
9:35-10:20	Elaboration on DiBiCoo long-term and information	*Mutala Mohammed (Ph.D.)*
10:20-10:40	*Group Photograph/ Snack break*	
Part-1: Panel Discussion – Opportunities and Challenges of Industrial-scale Biogas Implementation in Ghana		
10:40-11:30	Policies and Incentives for Bioenergy Development in Ghana	Reps from; - *Ministry of Energy* - *Energy Commission* - *Ministry of Environment, Science, Technology & Innovation* - *PFAN*
11:30-12:20	Operational and Strategic Realities of Conducting an Industrial-scale Biogas Business	Reps from; - *BAG* - *SAFISANA* - *ZOOMLION* - *Sewerage Systems Ghana Limited*
12:20-1:00	Questions & Answers	Moderator
1:00-2:00	*Lunch Break*	
Part-2: Group Discussions- Utilizing Sustainable Finance for the Development of Biogas Projects		
2:00-2:45	Designing a Financial Scheme for Industrial-scale Biogas Development	*A group comprising of Financial sector players, Development partners*
2:00-2:45	Simulating a Comprehensive Business Case for Ghanaian Biogas Development	*A group of comprising of Association members, producers and Development partners*

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2:00-2:45	Providing Enabling Environment through targeted policies	*A group comprising of policy actors, financial institutions, companies etc.*
	Snack Break	
2:45-3:15	Results Presentation from each Groups	*Moderator*
3:15-3:30	Closing	*ISEES*

4.1.2 Participants List

Table 12. Participants list of Ghana's First Local Stakeholder Workshop

No	Name	Affiliation
1	RB	Council for Scientific and Industrial Reearch (CSIR) – Institute of Industrial Research
2	ENON	Ghana National Cleaner Production Centre (GNCPC/EPA)
3	NM	Renel Ghana
4	MAA	Safi Sana
5	DD	Environmental Protection Agency (EPA)
6	JA	Beta Construction Engineers Limited
7	WDN	ARDO Ghana
8	AKO	Ministry Of Energy (MoEn)
9	IA	Africa Enviornmental Sanitation Consult
10	JD	Biogas Asscoaition of Ghana (BAG)
11	AR	African Renewable Energy Technologies (ARETech)
12	EO	CSO TV
13	PEK	Biogas Expert Tropical Limited
14	JSK	Community and Famiy Aid Foundation (CAFAF)
15	AAO	Public Financing Advisory Network (PFAN)
16	AI	Sewerage Systems Ghana Limited (SSGL)
17	JKY	Energy Commission (EC)
118	SN	Accra Metropolitan Assembly (AMA)
19	DKB	Archiaowo Biotech Consult
20	JAI	Biogas Technologies Africa Limited (BTAL)
21	CA	Biosewers Limited
22	SD	Ghana News Agency
23	HY	C2YA INT.
24	EUT	Energy Commission
25	CE	Strategic Youth Network for Development (SYND) – Renewable Energy Technologies Unit
26	EA	Smart and Safe Environment Limited
27	TEN	Kumasi Institute of Tropical Agriculture, KITA
28	EJD	Sustainable Energy Technologies Limited (SETECH)
29	TA	Ghana National Cleaner Production Centre (GNCPC/EPA)

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30	SAS	Safi Sana
31	JA	Biogas Asscoaition of Ghana (BAG)
32	NHA	Ghana Reducing Our Carbon (GROC)
33	EKB	Biogas Association of Ghana (BAG) / DAS Biogas Constructions Limited
34	SK	Biogas Asscoaition of Ghana (BAG)
35	PE	Econexus Ventures Limited
36	PM	Ministry of Energy (MoEn)
37	LSB	German Development Cooperation (GIZ - Ghana)
38	WAT	Ministry of Energy (MoEn)
39	EP	Biosewers Limited
40	PA	Ghana Association of Microfinance Companies (GAMC)
41	JSK	Ghana Bioenergy Association
42	PKF	Solidaridad West Africa
43	KT	Institute for Sustainable Energy and Environmental Solutions
44	JQ	Bioenergy Association of Ghana
45	AH	Biogas Association of Ghana
46	BEY	Biogas Association of Ghana
47	BJ	Bioenergy Association of Ghana
48	FL	Sustainable Energy Technologies Limited
49	LOT	Director, ISEES
50	MM	Projects Director, ISEES

4.1.3 Presented Materials

Presentation materials given in the workshop can be accessed in:

https://drive.google.com/open?id=1ZM0wXuUbaqmF9jH4jsaEv8zFDKWwPpnT – materials and pictures.

https://drive.google.com/open?id=1Dd_CW4HLYv9tM_eGkoQRRJ7_8JNe8_sr - presentations

4.1.4 Notable Highlight of the Workshop

4.1.4.1 Presentation / Panel Discussion Session

The program begun with an opening prayer followed by the introduction of participants. The director of the Institute for Sustainable Energy and Environmental Solutions (ISEES) gave his welcome address. In his welcome remarks, he stressed the need for all partners to come on board to ensure that the project delivers its objectives through the active participation by stakeholders in the activities of the project. Partners from Resilience Development Initiative (RDI – Indonesia) representated by Ichsan Hafiz Loeksmanto and Elizabeth Rianawati gave a brief presentation of RDI activities and the renewable energy situation in Indonesia. Elizabeth

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Rianawati highlighted project initiatives being implemented by RDI in the renewable energy sector in Indonesia.

The Project lead for Ghana on DiBiCoo, Dr. Mutala Mohammed, gave a detailed presentation explaining the concept behind the project and why Ghana was chosen as one of the importing countries. He took the participants through the implementation stages of DiBiCoo through the project inception to the project demo cases where concepts will be accepted, and one will be identified and supported up to the investment stage. He further laid out the stages in the project demo case and how people can participate in it.

Mr. Wisdom Togobo, the Director of Renewable and Alternative Energy at the Ministry of Energy, who was the keynote speaker welcomed the DiBiCoo project as its ideals fall in line with the Government of Ghana's Energy policies to promote biogas technology for households, industries and municipalities to improve sanitation as well as provide energy for industries. He added that biogas has a great potential for helping the government achieve its sanitation and energy access challenges in line with the Bioenergy Policy and the Renewable Energy Master Plan. However, he indicated that, one of the biggest challenges confronting biogas development in Ghana is the lack of technical know-how in the installation and maintenance of biogas plants as well as advanced technologies for biogas, thus the DiBiCoo project is a welcoming idea as it seeks to build capacity of biogas practitioners to gain access to markets both locally and internationally. Additionaly, Mr. Togobo indicated that the government is currently shifting its policy on feed-in-tariff to competitive bidding on renewable energy plants with the aim to decrease the price from the current $18 cents to $10 cents / kWh.

A first panel discussion made up of government, regulatory, legislative, and financial actors including representatives from the Ministry of Energy (MoEn), Energy Commission (EC), Environmental Protection Agency (EPA) and Public Financing Advisory Network (PFAN) was conducted. The representative from EC laid out the regulations that companies and organisations need to go through for licensing of renewable energy projects but indicated that the commission is working as part of its program of action for 2020 to develop standards and regulations for the biogas industry in order to streamline its operations and guidelines. He welcomed the DiBiCoo project as one that will help facilitate knowledge exchange with European partners and the DiBiCoo project partners in developing regulations for the biogas industry in Ghana. Mr. John Yeboah, the Senior Proramme Officer at the Bioenergy Unit of Energy Commission indicated that though the commission does not have the regulatory framework in place, the commission cannot grant permit & license for digester installation (energy generation), the commission has facilitated the installation of large-scale digesters including the Safi Sana biogas plant and HPW biogas plant through the engagement of government stakeholders. PFAN, a global network of climate and clean energy financing experts indicated that the firm has investment funds of up to 15 million Euros to help partner in developing demo projects and accessing finances for large-scale renewable energy projects in Ghana.

The second panel consisted of technology and industrial stakeholders including representatives from Sewerage Systems Ghana (a subsidiary of Zoomlion Ghana), Biogas Association of Ghana and Safi Sana Ghana. Specifically, the discussion centred on what standardization does the EC look at in terms of introduction of the new technology into the country. They further highlighted the challenges with the biogas industry and their interest in

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maintenance, operations, skills for effective management of large-scale digesters, feedstock supply, sorting, and feedstock quality challenges as well as access to finance to develop and sustain the biogas industry. Safisa Sana Ghana, a dynamic social enterprise with an installed biogas plant capacity of 1.6 MW daily production shared their experience in the sector over the past 15 years. They welcomed the DiBiCoo project as it intends to provide potential knowledge exchange and access to technology and capacity building skills that will help transform the biogas industry in Ghana.

Figure 11. Q&A session by participants of the first LSW in Ghana

4.1.4.2 Group Session

During the group session, participants were divided into three groups with each group consisting of different actors including government, industry, and regulators. Each group was given a set of questions to discuss and later present their findings. The topics focused on designing a financial scheme for industrial-scale biogas development, simulating a comprehensive business case for Ghanaian biogas development, and providing enabling environment through targeted policies.

The financial group was tasked to discuss investment options for biogas projects in Ghana. The group identified government as a major funding body as project developers could align biogas projects to government projects and programs such as the one District one Factory (1D1F) policy being implemented by government. Debit and equity financing were also identified as potential investment options. With regards to qualification of company to access funds from financial institutions, the group identified that there is the need for the company to possess the following attributes:

- good management system
- value preposition
- business model
- operational and implementation plan
- utilization of funds
- financial models and
- environmental and social impacts assessment

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The group further discussed the kind of capital that should be made available by the financial institutions to companies/organisations. Patient capital for early-stage businesses, loans from banks for start – ups and equity funding were identified as the main capital sources for funding biogas projects in Ghana.

The last question on financing was on incentive mechanisms currently available in Ghana. Members of the group all agreed that government should introduce good policies and tax incentives based on geographical area, age and number of employees by companies. It was also suggested that start - up companies have to enjoy at least 3 years tax relief. It was pointed out that waste management or processing companies have 7 years tax holidays in Ghana.

The second group focused on simulating a comprehensive business case for Ghanaian biogas development considering the available market opportunities in the country and the most potential feedstock sector for bioenergy development. Feedstocks from slaughterhouses (abattoir) and municipal solid waste were identified as the potential feedstocks for biogas because of the quantity of these waste produced within the capital city, Accra alone generating approximately 3000 tons of municipal waste daily with organic fraction constituting 50-60% of the waste generated. A number of sites were identified for potential biogas plants installation due to the availability of feedstocks in these locations and these included:

- Tema, an industrial city within the capital, because it has a large landfill site where majority of waste generated in the capital city are dumped.
- Nsawam, a capital of Akuapim South Municipality in the Eastern region, was also suggested to be a very good location for demo biogas development because of the large number of fruit processing factories in the area in addition to waste from prisons and abattoir.
- Kumasi, the capital city of Ashanti region and most populated region in Ghana, has a big, modernised slaughterhouse in the country.
- Juaben oil mill also located in Ashanti region was suggested as a suitable demo biogas location since the generation of biogas will help augment the energy use of the company as well as help in their waste management system.

The group suggested that since Ghana is an agrarian economy, it will make an economic sense to channel the slurry and digestate from biogas plants into farms for crop irrigation and fertilizer production. A community within a district assembly was used as a case study and identified as potential customers with the assemblies as the central actors. The unattractive electricity tariffs and policy change due to periodic changes of regimes were identified as major challenges that could hinder sustainability of the biogas project in Ghana.

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Figure 12. Discussion session of the first LSW in Ghana

The third group represented the government and regulatory institutions. They were tasked to identify the institutions involved in the process of acquiring project permit, the roles and responsibilities of government stakeholders involved in the implementation process as well as regulations that need to be paid attention to safeguard the implementation process. Energy Commission (EC), Ministry of Food and Agriculture (MoFA), Environmental Protection Agency (EPA), Fire Service, Forestry Commission (FC), Ghana standard Authority (GSA) and National Petroleum Authority (NPA) were identified as the government regulatory bodies in acquisition of permits for biogas development especially for electricity generation in Ghana.

The following institutions were suggested to play specific roles in the implementation process including:

- Energy Commission should be the mandatory body to grant licensing for biogas projects
- Environmental Protection Agency - permit
- Ghana Grid Company Limited (GRIDCO) - transmission of power to national grid
- Electricity Company of Ghana Limited (ECG) – power distribution
- Public Utilities Regulation Commission (PURC) – tariff regulation
- Fire Service - fire certification
- Forestry Commission - regulate tree felling

Issues such as licensing, environmental impact assessment, sustainability, packaging, and transport of digestate to farmers were identified by the group members as the regulatory issues that need to be paid attention to safeguard the implementation process.

4.1.5 Workshop Evaluation

4.1.5.1 What went well

All the major stakeholders in the biogas industry including government regulatory and legislative agencies, feedstock processors, project developers and financial institutions were represented. The take-away from the DiBiCoo workshop was the commitment expressed by the Director of Renewable Energy of the Ministry of Energy (Mr. Wisdom A. Togobo) and the

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Senior Programmes Officer of the Energy Commission (Mr. John Yeboah) to support the implementation of DiBiCoo in Ghana as the objectives of the project falls in line with the Government of Ghana's energy policies. The Energy Commission representative also welcomed the DiBiCoo project as one that will help facilitate knowledge exchange in developing regulations for the biogas industry in Ghana. In addition, PFAN indicated their readiness and willingness to support companies with good proposals on the demo cases to execute their projects and link them to finance of up to 15 million euros. As a result, a number of companies in the biogas sector showed interest in submitting their proposals for the demo cases. Sewerage Systems Ghana Limited (SSGL) indicated their readiness to submit a proposal on their existing anaerobic digestion (AD) treatment plants as demo cases to harness and utilize the biogas generated. Additionally, Biogas Technologies African Limited (BTAL) said they have just completed a feasibility study on the construction of a biogas plant for the University of Ghana with more than a 1MW generating capacity and are ready to work with DiBiCoo on the demo cases.

The presence of technicians who have also been involved in managing large-scale biogas projects enriched the workshop through their experience sharing. The challenges and potentials they raised was unique in outlining the technical skills required for efficient management of large-scale biogas digesters.

The Secretary of the Biogas Association of Ghana expressed their commitment to bring the technicians, companies and practitioners on board to share knowledge and build capacity under the DiBiCoo project in order to adopt the skills to promote large-scale biogas technologies in Ghana.

4.1.5.2 Points need improving

Not all participants of the group session are actively engaging in the discussion

The Ghanaian socio-cultural set up hindered group members participations during the breakout sessions especially those groups with high level authorities represented. The discussions were hijacked by senior members in the group who are usually respected in the society. Further, the breakout session should make the senior members in the group as facilitators as there are more informed than other members in the group.

The panel discussions were rich in bringing out contributions from other practitioners and government agencies, but it was also a bit long and made the time for group work a bit shorter.

Most participants especially from the Biogas Association of Ghana indicated the need for capacity for small scale biogas digesters since that is commonly on demand and the idea of building larger scale biodigesters were a bit far-fetched since they require bigger investments to install, and these happen once in a while by bigger and foreign companies. So, the request for inclusion of small-scale biogas digesters were expressed as a concern.

The time was too short to be able to iron out all the issues that the workshop brought up, a 2-to-3-day workshop would have been great in helping address all the issues raised. However future capacity building workshops should look at giving enough time to provide training and knowledge sharing space on the issues relating to biogas and biomethane.

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4.2 Second Local Stakeholder Workshop

4.2.1 Workshop Program / Agenda

Table 13. Agenda of the second LSW in Ghana

TIME	AGENDA	SPEAKER(S)
	***Thursday*, 27 May 2021**	
9:00-9:15	Registration	Committee
9:15-9:30	Opening and Introduction of participants	Dr. Latifatu M. Adjah
9:30-9:40	Welcome Remarks	Mr. Lovans Owusu-Takyi
9:40-9:50	Opening Remarks	Dr. Johannes Anhorn (GIZ, Germany)
9:50-10:00	Opening Remarks	Elisabeth Rianawati (RDI, Indonesia)
10:00-10:20	*Group Photograph / Snack break*	
10:20-11:00	DiBiCoo Update and Biogas market framework/financing options in Ghana	Dr. Mutala Mohammed, DiBiCoo Project Lead, Ghana
11:00-11:30	Financing options for biogas projects in Europe	Angela Sainz, European Biogas Association (EBA)
11:30-12:00	Regulatory fram ework for biogas development	Mr. Seth Mahu (Director, Renewable Energy, Ministry of Energy, Ghana)
12:00-12:40	What has worked for SafiSana?	Raymond Ategbi Okrofu, GIZ Ghana
12:40-13:00	Q & A	Dr. Latifatu M. Adjah
13:00-14:00	*Lunch Break*	
14:00-14:35	DiBiCoo Demo-/follow- case applications	Wlcek Bernhard, Austria Energy Agency
14:35-14:05	Introduction to DiBiCoo Matchmaking Tools	Aleksejs Zacepins: Latvia University of Life Sciences and Technologies (LLU)
14:05-14:50	Q & A	Dr. Latifatu M. Adjah
14:50-15:10	*Snack Break*	
15:10-15:40	Breakout Rooms for discussion and stakeholder feedback	Dr. Latifatu M. Adjah
15:40-15:50	Closing remarks	Mr. Lovans Owusu-Takyi, ISEES

4.2.2 Participant List

Table 14. Participants of the second LSW in Ghana

No	Name	Affiliation
1	JOA	Sewerage Systems GH. Ltd (SSGL)
2	KEQ	Ministry of Environment, Sciene, Technology & Innovation (MESTI)
3	KA	Beta Construction Engineers Limited
4	MM	Institute for Sustainable Energy & Environmental Solutions (ISEES)
5	LA	Council for Scientific & Industrial Research – Institute of Industrial Research (CSIR-IIR)

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6	RO	GIZ (SafiSana)
7	AAO	The Private Financing Advisory Network (PFAN)
8	EP	Biosewers Ltd
9	DRB	Council for Scentific & Industrial Research – Institute of Industrial Research (CSIR-IIR)
10	CA	Biosewers Ltd
11	YOI	Ghana National Cleaner Production Centre/Environmental Protection Agency (GNCPC/EPA)
12	AQ	Council for Sceintific & Industrial Rzesearch – Institute of Industrial Research (CSIR-IIR)
13	DD	Ghana National Cleaner Production Centre/Environmental Protection Agency (GNCPC/EPA)
14	RA	Rockson Ankomah Foundation
15	SM	Ministry of Energy (MoE)
16	PAA	Energy Commission (EC)
17	JSK	Ghana Bio-energy Association
18	MO	Environmental Service Providers Association (ESPA)
19	MPA	A Rocha Ghana
20	PE	Econexus Ventures Ltd
21	JAI	Biogas Technology Africa Ltd (BTAL)
22	AOA	Institute for Sustainable Energy & Environmental Solutions (ISEES)
23	LOT	Institute for Sustainable Energy & Environmental Solutions (ISEES)
24	AA	Ghana News Agency (GNA)
25	SD	Ghana News Agency (GNA)
26	CL	Solar Vendors Limited
27	GQ	Institute for Sustainable Energy & Environmental Solutions (ISEES)
28	DD	Institute for Sustainable Energy & Environmental Solutions (ISEES)
29	RT	Institute for Sustainable Energy & Environmental Solutions (ISEES)
30	LV	Institute for Sustainable Energy & Environmental Solutions (ISEES)
31	SR	Institute for Sustainable Energy & Environmental Solutions (ISEES)
32	OA	Sustainable Energy Technologies Limited

Online Participants

No	Full Name	Organisation/Institute
1	DOB	Impact Environmental Ltd
2	ROT	University of Health and Allied Sciences
3	DA	Offinso Partners in Sustainable Development
4	AW	SolarTail Limited
5	EKN	University of Cape Coast
6	WMG	Transformational Empowerment and Rural Integration
7	RM	Alliance for Empowering Rural Communities
8	DKB	Archmond Biotech Consult
9	JJKMA	Beta Construction Engineers Ltd
10	IAO	Biotech Innovations
11	ITT	DiAgri Investment Enterprise
12	GA	Strategic Power Solutions
13	JA	Built Deco Construction Ltd

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14	EAU	University of Ghana Medical School
15	AAU	Quality Trust Ghana Limited
16	BOP	Kwame Nkrumah University of Science and Technology
17	JKY	Ho Technical University
18	MAM	Wasted Energy Company Limited
19	FO	Ashesi University
20	AO	Businesses Resource Center
21	IN	Community Help
22	EYA	Renewable Energy Association of Ghana (REAG)
23	EAA	Wonder Classics
24	SN	Local Government Service
25	CDC	Jack & Jay Company limited
26	EKA	Green Energy and Logistics consult
27	BAA	Nasam Brand Enterprise
28	EN	Energy Commission
29	DBB	University of Environment and Sustainable Development
30	BB	Jerphbuck farms
31	BOP	Kwame Nkrumah University of Science and Technology
32	SQD	University of Environment and Sustainable Development, Ghana
33	AM	Nepal Agricultural Research Council
34	AS	Young Biogas Engineering
35	PW	Fidelity Bank
36	JOA	Sewerage Systems Ghana Ltd
37	ENDA	Global Climate Change Resolution
38	AK	University of Ghana
39	TDB	TDB Janitorial and Maintenance Service
40	MY	L biotech Engineering
41	CA	Charliza Pharmacy
42	SOT	KITA www.kitaghana.org
43	WT	Truswen
44	RP	International foundation for students and youth development IFSYD
45	TA	Ghana National Cleaner Production Centre
46	JA	GIZ
47	IA	Africa Environmental Sanitation Consult
48	IAO	Biotech Innovations.
49	NP	Resilience Development Initiative (RDI) Indonesia

4.2.3 Presented Materials

Presentation materials can be accessed in: https://bit.ly/DiBiCooWorkshop2Ghana

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4.2.4 Notable Highlights of the Workshop

4.2.4.1 Presentation / Panel Discussion Session

The program begun with an opening prayer followed by the introduction of participants. The director of the Institute for Sustainable Energy and Environmental Solutions (ISEES) gave his welcome address. In his welcome remarks, he commended the stakeholders for their active participation in DiBiCoo activities so far particularly on the high interest shown by stakeholders/project developers in the demo-/follow-case applications. As part of his welcome address, Mr. Owusu-Takyi indicated that the key areas of ISEES is to create a sustainable market and to enhance access to renewable energy for both grassroots and businesses, and thus the DiBiCoo Project sets itself very well with the activities of the organisation. He further highlighted that as an organisation, they want to make sure that technology transfer between Europe and Africa is increased and knowledge is spread to understand the technologies that are in Europe and be able to adopt them in Ghana. He called on district assemblies, companies that are working in fruit juice, those who are into animal husbandry and others would be able to understand the concept of biogas technologies and be able to raise the profile of biogas in Ghana.

Elisabeth Rianawati, the director of Resilience Development Initiative (RDI – Indonesia) as partner on the DiBiCoo project welcomed the stakeholders and showed their appreciation to the stakeholders for their commitment and dedication to the DiBiCoo project. The DiBiCoo project coordinator, Dr. Johannes Anhorn from GIZ, Germany also thanked the stakeholders and further highlighted the benefits and impacts of the projects.

The Project Lead for Ghana on DiBiCoo, Dr. Mutala Mohammed, gave a detailed presentation and update of DiBiCoo activities including biogas framework as well as financing options for biogas projects in Ghana. Highlights of the presentation including the macro-/PESTEL analysis of the biogas sector in Ghana i.e., regulatory framework, legislations, policies & financing options. He mentioned that despite the promulgation of the Renewable Energy Act (Act 832) of 2011, the lack of diversity in the renewable energy sector continues to be a big challenge with more investment being chanelled to the Solar PV technology than the other renewable energy technologies i.e., biogas. However, Dr. Mohammed in his conclusion indicated that, the biogas sector presents huge opportunity for large scale digester installers as the market is still untapped with less competition for large scale biogas installer companies as most of the local installers mainly focus on small scale/household digesters. He attributed this to lack of capacity by the local companies to operate in the commercial biogas installation sector which present an opportunity for the European commercial biogas companies.

Mr Seth Mahu, the Director of Renewable Energy of the Ministry of Energy, who represented the Minister for Energy, gave the assurance in an address, said the time had come for biogas to be brought into proper focus in Ghana because of the enormous opportunity it presents for the country. He indicated that a search at the Energy Commission indicated that the Commission has already taken measures to draft the first biogas regulatory framework and after this event, the Ministry was going to escalate it and get the Minister to communicate to the Executive Secretary to expedite action in developing and completing the framework for the industry. He further provided the stakeholders the Minister's assurance that they are going to

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work with the Energy Commission to ensure that the regulatory framework for biogas is developed as quickly as possible. Mr Mahu said when that was done it would assist to turn waste into useful products such as biogas for electricity generation for heat and other applications while helping to address the major sanitation issues that confront the country. This he said it would also go a long way to bring in the needed investment, both local and foreign, to be able to accelerate and sustain the development of the economy. He indicated that through the Ministry the Bio-Energy National Action Plan has been developed and the draft-final is currently on the Minister's desk. In that regard, he invited the stakeholders present to join the ministry in the final review of the document to ensure that it meets the expectation of the industry.

Mr. Prosper Ahmed Amuquandoh, the Inspector in-charge of Renewable Energy at the Energy Commission, urged practitioners in the biogas industry to be self-regulatory by helping the commission to weed out those who do not comply with regulations. In his remark, he indicated that in every jurisdiction where the market thrives, you would realize that statutory regulation has very little role to play because the industry is self-regulatory.
Mr Amuquandoh said concerning the Renewable Energy Act, he indicated that it has been sent back to Parliament for amendment, which had already been done to allow Bui Power to get to the forefront of Renewable Energy activities and to address issues with tariffs and competitive bidding.

Mr. Raymond Ategbi Okrofu, a former Country Director of SafiSana Ghana, an international social enterprise that has developed a circular waste-to-resource business model for local waste treatment for governments, utilities and food processing industries, made a presentation on what has worked for the company i.e., challenges and lessons learned during the implementation of the first ever commercial biogas plant in Ghana. He highlighted issues of waste quality, lack for subsidy, licensing and permit as well as high initial capital investment required as the major challenges the company was confronted with at the implementation stage. As part of the lessons learnt so far, he highlighted issues such as: a huge in-balance between demand and supply; obstacles to scaling up; very limited funding options for municipalities; need for tangible political commitment; increased community engagement; management of people's expectations and bridging the skills gap in the market.
A presentation on the outcome of the demo-/follower case application was made by Mr. Bernhard Wlcek from the Austrian Energy Agency (AEA). He took the participants through the criteria and evaluation process for the outcome of the demo case applications. In the case of Ghana, Beta Construction Engineering Limited was awarded the demo case applicant after a thorough evaluation process by the consortium, with additional five applicants as follower cases. Participants were informed on the next stages of activities.

Aleksejs Zacepins from Latvia University of Life Sciences and Technologies (LLU) introduced the Biogas and Gasification Matchmaking Platform developed by DiBiCoo to the stakeholders as a platform to engage stakeholders from Europe and other countries. Stakeholders raised the issue on the use of the matchmaking platform developed by DiBiCoo for stakeholders without compromising on the information provided by stakeholders. The discussion centred more on the matchmaking platform developed by DiBiCoo for stakeholders on privacy issues. The developers from LLU assured stakeholders that the necessary measures have been put in place to ensure that information provided by visitors on the platform are not compromised.

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4.2.5 Workshop Evaluation

4.2.5.1 What went well

Relevant stakeholders in the biogas industry including government regulatory and legislative agencies, feedstock processors, project developers and financial institutions were represented at the workshop. The take-away from the DiBiCoo workshop was the commitment expressed by the Director of Renewable Energy of the Ministry of Energy to support the development of regulations for the Biogas sector in Ghana. This was reiterated in the media publication published here: https://dibicoo.org/energy-ministry-to-develop-regulatory-framework-for-biogas-industry/. PFAN (Private Financial Advisory Network) reiterated their readiness and willingness to support companies with good proposals and indicated that their funding is opening soon and will be happy to consider DiBiCoo Project Developers to apply for the funds.

4.2.5.2 Points Need Improving

Project developers i.e., demo- and follower cases will want to know exactly what they stand to benefit from DiBiCoo. It was agreed that either a written contract or a term of reference (TOR) should be shared with participants spelling out in detail what they stand to benefit as it is not clear yet.

Figure 13. Participants at the workshop (left) and Mr Prosper Amuquandoh making a clarification (right)

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Figure 14. Mr Raymond Akrofu presenting at the meeting (left) and PFAN Coordinator Agnes Ansah Osei answering questions (right)

Figure 15. Lovans interacting with the MC Dr Latifatu Adjah (left) and Mrs Agnes Ansah Osei of PFAN addressing the participants (right)

Figure 16. Mr Idan making a contribution (left) and Mr Prosper Auguandoh interacting with Mr Idan (right)

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Figure 17. A section of participants at the face-to-face meeting.

Figure 18. Mr Seth Mahu, the Director of Renewable Energy at the Ministry of Energy addressing the participants.

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5. Argentina

5.1 First Local Stakeholder Workshop

5.1.1 Workshop Program / Agenda

Taller Internacional Desarrollo del biogás en Argentina sector urbano/industrial /DiBiCoo

Date: 10 March 2020, Buenos Aires, Argentina
Time: 08:30 hs a 13:30 hs
Venue: Salon de la Fundación ArgenINTA
Cerviño y Ocampo - Ciudad Autónoma de Buenos Aires, Argentina

Idioma Castellano e Inglés

This workshop is organized within the framework of the DiBiCoo project" (www.dibicoo.org) in cooperation with the National Institute of Agricultural Technology (INTA), and the Ministry of Agriculture, Livestock and Fisheries and the business chambers linked to the CEMA and CADER sector. The objective is to contribute to the development of biogas technologies, capable of processing different types of biomass produced in urban and industrial areas. Studies and useful concepts will be presented for the generation of projects that will be located in Argentina. Opportunities and challenges of this type of enterprise will be discussed through a participatory workshop.

DiBiCoo is an international project supported by the European Commission's Horizon 2020 program and implemented by GIZ in cooperation with 12 experienced organizations on four continents. The overall objective is to establish closer cooperation between European technology providers and biogas stakeholders in the participating countries.

08:30 **Acreditación /** *Registration*

09:00 **Welcome to the workshop**

JORGE HILBERT / JEETEN KUMAR

09:15 **The Dibicoo Project Objectives and activities**

JORGE HILBERT / JEETEN KUMAR

09:45 **Biogas in Argentina as a result of studies on opportunities and challenges in Argentina PROBIOMASA program**

MIGUEL ALMADA (MINAGRO), ARGENTINA

10:05 **Biogas in Europe and the world - State and future perspectives (In English)**

JEETEN KUMAR, PROGRAM MANAGER RESILIENCE DEVELOPMENT INITIATIVE

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10:25 *Coffee Break*

11:00 **Discussion table on the demands and challenges of biogas in Argentina from the perspective of the actors in the sector**

CEMA Y CADER

11:30 **Presentation of the opening to the call for the presentation of projects to be financed by Dibicoo until the investment stage**

12:15 **Work in an interactive discussion workshop on demands, opportunities that this technology poses in Argentina. Attendees will be divided into three specific groups:**

a. Group 1: Regulations and Policies
b. Group 2: Business Models
c. Group 3: Financing

13:00 **Presentation of the conclusions of the workshops**

5.1.2 Participant List

The workshop was held in INTA building with a conference room with a total capacity of 80 people and three different rooms for group work. The main auditorium was prepared for the general presentations and six tables were placed on the different rooms for the group work.

Ultimately, the workshop drew over 50 participants from various professional backgrounds. This included public officials from national and sub-national governments, project developers and technology providers from the private sector, practitioners from the non-profit sector, entrepreneurs, plant technicians, and researchers. Most of the participants were from the private sector. Before the workshop began forms were delivered and completed and signed by participants regarding confidential agreement and individual work.

5.1.3 Presented Materials

The full presentations are available at the local DiBiCoo page:
https://dibicooarg.wixsite.com/inicio

5.1.4 Notable highlight of the workshop

The duration of the workshop was around 6 hours, from 08.30 to 14.30.

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The workshop began with several presentations about the DiBiCoo project closely followed by presentations from probiomasa, CADER and CEMA in order to give a broad perspective of biogas present for the governmental, research and private sectors. Finally, there was a specific presentation to launch the call for project ideas presentation to the project. Forms were delivered and a specific online was launched https://forms.gle/AQHU2dnpUL4zN5128

After the presentations, a networking coffee break was offered in order to let assistants exchange ideas and views on biogas systems and reality.

After the break participants were divided into 6 separate groups for a more focused discussion regarding different talking points that were determined beforehand. Each group had a coordinator in charge of organizing the session, taking notes and presenting them in the final plenary session: all the groups worked on the following aspects

a) Policies and regulations

b) Business models

c) Finance

The main conclusions drawn by each of the coordinators of the tables identified by colour were edited and presented. These conclusions were also sent to each of the registered participants and loaded to the local webpage.

At the end in the plenary session each facilitator presented the main conclusions obtained by the groups and there was time for questions and comments from the audience. The conclusions of the tables and the presentations were sent to all the registered participants, and it was also loaded to the DiBiCoo Argentina web page.

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Figure 19. Different stages of the group sessions and the final conclusion presentations by the facilitators in the first LSW in Argentina

5.1.5 Workshop Evaluation

5.1.5.1 What went well

- Ultimately, the workshop drew over 50 participants from various professional backgrounds. This included public officials from national and sub-national governments, project developers and technology providers from the private sector, practitioners from the non-profit sector, entrepreneurs, plant technicians, and researchers.
- The implementation of breakout rooms with different topics allowed the participants to discuss and share deeply in the topic of finance, business model, and regulation/policies with smaller group.
- Clear and detailed guiding questions helped the discussions and in gathering information from participants.

5.1.5.2 Points need improving

Due to political and financial instability in the country, regulations keep changing every election cycle and financial institutions including banks often find it difficult to support the development of the biogas sector. Therefore, there are roles of DiBiCoo addressing the opportunities in informing Argentina stakeholders of lesson learned especially in long-term policies related to energy transition. The country also has plans to draft a new law to distribute more small-scale power plants in isolated areas that can benefit from biogas development. The implementation of the workshop could be improved to provide more intensive discussions and sharing so more key takeaways can be loaded.

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6. Republic of South Africa

6.1 First Local Stakeholder Workshop

6.1.1 Workshop Program / Agenda

DiBiCoo South African Local Stakeholder Workshop#1: South African biogas market and framework analysis
Date: **29 June 2021**
Time: **09h00 – 12h00 SAST**
Venue: **Enlit Africa platform (swap card)**

Workshop broadcast date: Tuesday 29 June

07h00 to 10h00 GMT | 08h00 to 11h00 London | 08h00 to 11h00 Lagos | 09h00 to 12h00 Johannesburg | 10h00 to 13h00 Ethiopia

As a South African project partner for the Digital Global Biogas Cooperation (DiBiCoo) project, Greencape will host a workshop on the current market and legislative framework of the biogas sector in South Africa on Tuesday 29 June. The workshop is part of the European Union Horizon 2020 funded Digital Global Biogas Cooperation (DiBiCoo) project.

JUNE 2021

29

REGISTER

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Attendees will be afforded an opportunity to gain a better understanding of the biogas market landscape and provide feedback and insight on their own experiences related to the content presented.

THE AGENDA

The workshop kicks off with a welcome and opening address by Jack Radmore and Yaseen Salie of GreenCape, followed by:

- DiBiCoo overview, Dr Johannes Anhorn, DiBiCoo Coordinator, GIZ and Ann-Kathrin van Laere, DiBiCoo, Junior Project Manager, GIZ
- SA biogas context, Alberto Borrelli and Jason Gifford, Chairman, South African Biogas Industry Association
- SA biogas market barriers, Yaseen Salie, Bio-Energy Analyst, GreenCape

This is followed by simultaneous live and interactive breakaway sessions:

- Facilitated by Dwight Rosslee, Director, Selectra
- Facilitated by Mandisa Mkhize, Renewable Energy Sector Desk, GreenCape
- Facilitated by Tawanda Sango, Research Analyst, GreenCape

The workshop culminates in:

- DiBiCoo online platform presentation, Aleksejs Zacepins, Scientific Project Manager, DiBiCoo Project at Latvia University of Life Sciences and Technologies
- Plenary discussion on breakaway sessions with the Q&A session facilitated by Jack Radmore, Energy Programme Manager, GreenCape
- The workshop will be closed by Yaseen Salie explaining the next steps for the South African chapter of DiBiCoo.

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WHY YOU SHOULD JOIN US LIVE

- Gain a better understanding of the biogas market landscape
- Provide feedback and insight on your own experiences related to the content presented.
    - This includes the theoretical biogas market potential, the legislation that impacts a biogas project and the key stakeholders active in the biogas sector.
- Engage with industry peers on the digital platform
- Ask your questions LIVE directly to speakers
- Watch and listen anytime, anywhere
- Get access to premium industry content already on the digital platform, Enlit Africa-Connect

SECURE YOUR SEAT AND REGISTER NOW

Table 15. Agenda of the first LSW in South Africa

Time	Topic	Organisation	Person	Comments
09:00 - 09:10	Welcome and opening	GreenCape	Jack Radmore	GreenCape to welcome audience to event. Welcome slide on background
09:10 - 09:25	Presentation 1 - DiBiCoo overview	GIZ	Ann-Kathrin van Laere	DiBiCoo project co-ordinator to present an introduction to the DiBiCoo project
09:25 - 09:40	Presentation 2 - RSA Biogas context / Market position paper	SABIA	Alberto Borrello	SABIA to present their market position paper on biogas sector
09:40 - 09:55	Presentation 3 - RSA biogas market barriers (Public, Technical & Financial)	GreenCape	Yaseen Salie	GreenCape to present the DiBiCoo market and

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				framework report (D3.3)
09:55 - 10:05	Breakaway sessions overview and purpose	GreenCape	Jack Radmore	GreenCape to provide process and purpose of breakaway sessions
BREAK (10:05 - 10:15)				
10:15 - 10:45	Breakaway session - Public barriers - Municipal implementation (10 mins)	Facilitator 1	Tawanda Sango / Nadiya Pranindita (RDI) / Elisabeth Rianawati (RDI)	10 mins for each topic. The facilitator will navigate betweem each topic of dicussion using seed questions as discussion starter.
	Breakaway session - Financial barriers (10 mins)			
	Breakaway session - Technical barriers (10 mins)			
10:15 - 10:45	Breakaway session - Public barriers - Municipal implementation (10 mins)	Facilitator 2	Mandisa Mkhize / David Ayisi (Selectra)	10 mins for each topic. The facilitator will navigate betweem each topic of dicussion using seed questions as discussion starter.
	Breakaway session - Financial barriers (10 mins)			
	Breakaway session - Technical barriers (10 mins)			
10:15 - 10:45	Breakaway session - Public barriers - Municipal implementation	Facilitator 3	Dwight Rosslee (Selectra) / Raldo Kruger	10 mins for each topic. The facilitator will navigate betweem each topic of dicussion using seed questions as discussion starter.
	Breakaway session - Financial barriers (10 mins)			
	Breakaway session - Technical barriers (10 mins)			
BREAK (10:45 - 10:55)				
10:55 - 11:05	Presentation 4 - DIBiCoo online platform	LLU	Vitalijs Komashilov	LLU to provide an introduction to the DiBiCoo online platform

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11:05 - 11:35	Plenary discussion - Feedback from breakaway sessions	Panelists	**Moderator:** Jack Radmore (GreenCape) **Facilitators:** Dwight Rosslee (Selectra); David Ayisi (Selectra); Tawanda Sango (GreenCape) **Panelist:** Yaseen Salie (GreenCape)	- Jack to introduce panel & moderate discussion - Each facilitator will have 5 mins minutes to provide feedback on key insights from their breakaway room (First 15 minutes of Plenary discussion) - Jack to ask directed seed questions to facilitators and panelist (Last 15 minutes of Plenary discussion)
11:35 - 11:50	Q&A	GreenCape	Jack Radmore	Jack to be fed questions for the facilitators and panelist that are raised on the Enlit Africa Connect platform
11:50 - 12:00	Next steps & closing	GreenCape	Yaseen Salie	GreenCape to close out event

6.1.2 Participants List

Out of more than 340 registrants, there were more than 90 participants who attended the virtual workshop on the Enlit Africa swapcard platform and 36 watched the on-demand recorded content on the platform. However, there were only 67 participants who were willing to consented to attendance on the platform and are list below as follows:

Table 16. Participants of the first LSW in south Africa

No	Name	Company
1	AM	PROTOTIPI Nigeria
2	PA	University of Benin
3	AvR	Vital Engineering
4	AB	Kainos Projects Africa
5	AK	PPP Training Online (Pty) Ltd
6	ArK	Semane Engineering Solutions
7	AN	The Polygot Group
8	AZ	Self
9	BW	Austrian Energy Agency
10	CM	Songo Power Tech (pvt) Ltd
11	CK	KPC
12	CM	Centre of Engineering Excellence

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13	DA	Zutari
14	DM	Exxaro Resources Ltd
15	USK	Danquilah Solar Venture
16	DF	Independent
17	DA	Selectra cc
18	AD	University of KwaZulu-Natal
19	DC	Heimdall
20	DL	Genergy
21	DB	Bio2Watt
22	DR	Selectra
23	EV	Sasol
24	ER	Resilience Development Initiative
25	SF	Yung Sheng Pulp
26	HR	MAN Truck & Bus SE
27	HV	ECOlaTRINE
28	JS	NANO ENERGY
29	JA	The Energy Centre
30	JSB	Resiliant Circular
31	JW	Milton Margai College of Education and Technology
32	JN	John Thompson - Actom
33	KG	Private company
34	LJ	Itemba Technical Services
35	LGS	Per Aarsleff A/S
36	LS	MATSAMO HOLDINGS (PTY) LTD
37	LV	Mitochondria Energy Company
38	MM	TotalEnergies
39	VM	N/A
40	PD	University of Cape Town
41	MS	Talbot
42	MM	Department of Trade, Industry and Competition
43	MAJ	Sumitomo
44	MN	LignOrganic
45	SS	N Projects Media
46	NS	John Thompson a div of ACTOM (Pty) Ltd
47	JN	Irrifarm technologies
48	PsT	ReA-Con
49	QM	Engen
50	RA	Institute for Justice and Reconciliation
51	RV	AnnaHub
52	RH	Diehl Metering GmbH
53	RW	Rockmills Financials LImited
54	RO	Advance International Business Development
55	SA	Aadvika Engineers
56	SA	Aadvika Engineers

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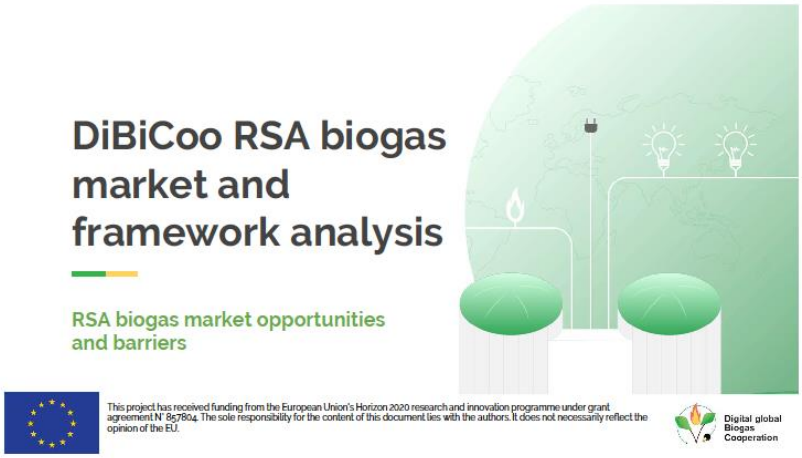
57	SG	Diesel & Motor Engineering PLC
58	SHR	K Electric Ltd.
59	SS	Sasol
60	SE	SOCIETE GENERALE
61	TF	John Thompson - Actom
62	MAT	Centon Group Pty Ltd
63	TN	(UNESCO) United Nations Educational Scientific and Cultural Organization
64	TN	Private Financing Advisory Network
65	VL	TotalEnergies
66	VM	Public Investment Corporation
67	HU	iRCB (Pty)Ltd

6.1.3 Presented Materials



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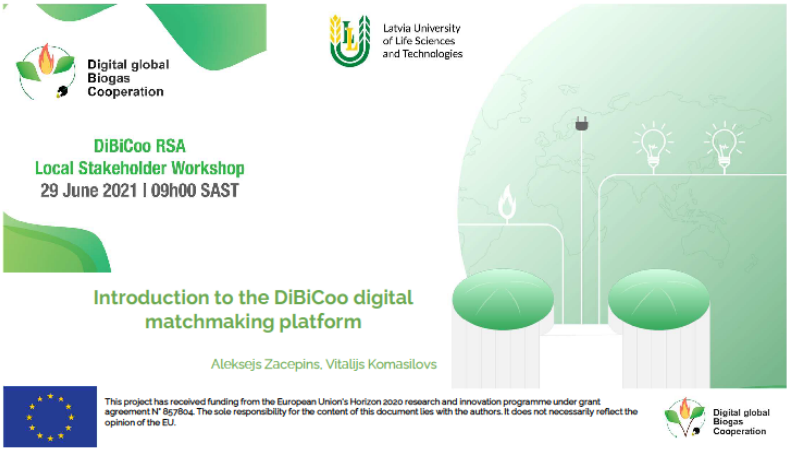

6.1.4 Notable Highlights of the Workshop

As part of the DiBiCoo project, the 1st local stakeholder workshop within South Africa was focused on sharing and validating the information compiled in Deliverable 3.3 - Biogas Markets and Frameworks in Argentina, Ethiopia, Ghana, Indonesia, and South Africa with an emphasis on the South African section. The workshop was divided into two primary sessions, viz. the presentation session and the breakaway and feedback session.

6.1.4.1 Presentation Session

The presentation session included four presentations. The presentation provided an overview of the DiBiCoo project activities, the current market potential for biogas in South Africa, the market and framework report summary, and an introduction the biogas and gasification matchmaking platform.

The first presentation was delivered by Ann-Kathrin van Laere of GIZ. She provided an overview of the DiBiCoo project objectives activities, offering, and list of demo case projects that DiBiCoo was supporting. The activities included highlighting the capacity building, trainings, web seminar series, study tours and networking opportunities to be held. The audience were provided with a clear indication as to how they could participate and benefit from the DiBiCoo project.

The second presentation was delivered by Alberto Borrello, Secretary General of the Southern African Biogas Industry Association (SABIA). He highlighted the role and activities of SABIA and its benefits as an industry association for the biogas sector within South Africa. Alberto further presented SABIA's 2021 published market position paper that highlighted the biogas market and investment potential. The audience were provided an opportunity to join the biogas industry association and contribute to growing the biogas market within South Africa.

The third presentation was delivered by Yaseen Salie, project manager and team lead for GreenCape's DiBiCoo project team. He provided a summary of D3.3 – Biogas Markets and Frameworks in Argentina, Ethiopia, Ghana, Indonesia, and South Africa which included a

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macro analysis – relative to biogas in South Africa, national biogas market overview, biogas market drivers, logistical infrastructure, factors that influence biogas market entry, factors that influence biogas development and implementation, and legal framework – relative to biogas. He further highlighted that for the South African biogas market to grow and mature successfully, it is important to consider the local context that it can be implemented so that the most viable business case for biogas can be developed.

The final presentation was delivered by Dr. Vitalijs Komashilov of the Latvia University of Life Sciences and Technologies. He introduced the Biogas and Gasification Matchmaking Platform that could be used by biogas and gasification stakeholders. They explained that their main task is to provide a digital platform to facilitate convenient matchmaking tools between actors of exporting and importing markets for biogas technologies. They presented the development process of the platform. They developed the platform through an iterative and agile process. The platform is also open to the public and available for everyone. The authenticated users will have some personalized features in the platform compared to anonymous users.

6.1.4.2 Audience poll chat box discussion for presentation session

An audience poll was conducted during the presentation session of the workshop. The results can be seen below:

1. What sector do you think the biggest and/or most barriers lie within? (6 votes · Final results)

   33%Legislative framework
   33%Development Financing
   17%Implementation Financing
   0% Technology maturity
   17%Skilled workforce

2. What sector do you think holds the most opportunity for biogas technologies? (6 votes · Final results)

   67%Municipal
   17%Agriculture
   17%Commercial and Industrial
   0%Residential

3. Which sector do you see as holding the most potential for biogas technologies? (8 votes · Final results)

   38%Energy
   38%Waste management
   25%Wastewater treatment
   0%Agriculture
   0%Investment and job creation

4. Have you been active before in the biogas sector or are you new to the biogas sector before today? (8 votes · Final results)

   38%Previously active
   63%New

5. Have you engaged with any of DiBiCoo consortium partners before? (7 votes · Final results)

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14%Yes
86%No

6. Were you aware of the DiBiCoo project before today's workshop? (7 votes · Final results)

   0%Yes
   100%No

7. In what capacity are you attending this workshop? (4 votes · Final results)

   0%Academic
   25%Turnkey provider
   25%Equipment / Component supplier
   0%Site owner
   0%Feedstock / Waste generator
   0%Municipality
   0%National or Provincial regulator
   0%Financial investor
   50%Other

8. Do you think the online DiBiCoo platform could save a project both time and money with RSA? (3 votes · Final results)

   100%Yes
   0%No

9. Is your business/organisation registered on the online DiBiCoo platfrom? (2 votes · Final results)

   0%Yes
   100%No

During the workshop, all participants were encouraged to put their questions into a Q&A box so that speakers could respond.

9:50 AM: Hi Yaseen large municipal projects can be developed using PPP procurement methodologies. Can you identify succesfull municipal bio-gas projects?

9:44 AM: Are the South African biogas projects listed commercially viable (paying off their capital) at present, or are subsidies or special dispensation required?

11:26 AM.: Is there any way to more formally bring waste pickers into the municipal biodigester system - to help clean up what waste ends up at landfills to make it easier for the municipalities to use the waste?

11:23 AM : Understandably there is a big focus on biogas, however could some comments be made with regards to the relevance and inclusion of biomass (wood) in Dibicoo?

1:49 PM: how do i put my business needs on the platform

11:43 AM: Any comment on the status of policy or other supporting mechanisms, e.g. tax incentives, carbon credits, Renewable Energy Certificates, that can subsidize or support the development of biogas projects in South Africa? Are these policies and mechanisms being developed for South Africa, or are they already in place?

11:23 AM: what about creating networks of small projects like at schools/universities/early childhood development centres? Instead of thinking of large projects, aggregating small projects?

11:03 AM: will this matchmaking platform be divided by geographic region or is it a global free for all?

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6.1.4.3 Break Out Room & feedback discussion session

In this session, all participants were divided into three rooms. In each room has 2-3 facilitators to facilitate a discussion on three discussion points with guide questions as follows:

Public barriers - Municipal implementation seed questions

1. What's the minimum viable size of municipal biogas projects?
2. What about the risks of developers putting proposals together for municipalities, but the project still needs to go out on tender?

Technical barriers seed questions

1. Can biogas projects be bundled with other upstream WWTW upgrades (i.e. to improve feedstock quality / consistency)?
2. How do we ensure that equipment or components used in biogas projects are of high enough quality with the limited existing standard of practice within RSA?

Financial barriers

1. With the current energy crisis, landfill bans and water scarcity in recent times within RSA, why has it been difficult for biogas technologies to compete with these other technologies in terms of cost and returns?
2. In your opinion, which sector do you think is currently the most viable to implement a biogas project? and why?

Based on the notes from the three rooms, we can summarize that the discussions support the information compiled in D3.3 – Biogas Markets and Frameworks in Argentina, Ethiopia, Ghana, Indonesia, and South Africa. The feedback session for the three breakaway sessions was moderated by Jack Radmore where the following questions were asked and addressed by breakaway session facilitator and panellist:

For breakaway session 3 facilitator (Dwight Rosslee)

Based on the discussions we had today and your experience, what do you think would be the most efficient way to streamline the development of municipal biogas projects (WWTW and waste treatment facilities)?

For breakaway session 1 facilitator (Tawanda Sango)

Based on the discussions we had today and your experience, do you think that the legislative space will become more enabling towards the biogas sector? If so, how so? If not, why not?

For breakaway session 2 facilitator (David Ayisi)

What level of impact can improper planning and construction have on a biogas project in its lifespan?

For panelist speaker (Yaseen Salie)

Based on your presentation and discussions we had today, what biogas project models would you say are not currently viable now, but may be in the future should energy, waste or water legislative landscape change within RSA?

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6.1.4.4 Closing remarks

The workshop was closed out by Yaseen Salie highlighting upcoming activities that the DiBiCoo project would be conducting within South Africa

6.1.5 Workshop Evaluation

6.1.5.1 What went well

Due to Covid-19 pandemic, hosting the workshops on a virtual platform enabled us to better promote the DiBiCoo project and Biogas & Gasification Matchmaking Platform. Implementing the workshop on the Enlit Africa platform increased the reach to key stakeholders in the renewables sector that have not previously been exposed to the biogas market in South Africa. A virtual platform also allowed for learnings from a broader spectrum of global speakers to occur and the networking has helped in identifying key stakeholders in other relevant sectors within RSA, such as private, public, finance, technical, etc.

The use of Enlit Africa showed other advantages such as wider reach of activities, not only for DiBiCoo partners. It can be seen in the below picture, the number of users and viewers in DiBiCoo and the first LSW page was divided into various countries in Asia, Africa, Europe, to America.

Figure 20. Participant structure of the first LSW in South Africa

6.1.5.2 Points need improving

The first LSW showed that although virtual networking is possible, it is only shown to be successful if the platform for networking is found on the same platform the workshop is held. For first-time users of Enlit Africa, it would take some time to get used to the features offered by the platform. Therefore, in addition to the registration link, brief guidance on how to use the platform or access the specific page after registration could be provided together with the invitation/any promotional tools.

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6.2 Second Local Stakeholder Workshop

6.2.1 Workshop Program / Agenda

DiBiCoo South African Local Stakeholder Workshop#2: South African biogas market and framework analysis
Date: **20 October 2021**
Time: **09h00 – 12h00 SAST**
Venue: **Enlit Africa platform (swap card)**

Keynote Address

Dr Timothy Afful-Koomson,
Chief Climate Finance Officer
African Development Bank (AfDB)

Join us on **20 October 2021** for the DiBiCoo Keynote address from **09h10 – 09h30 SAST** as Dr Afful-Koomson the Chief Climate Finance Officer from the African Development Bank (AfDB), provides an overview of the current activities of the climate change finance space within Africa, the role of South Africa and the climate change technologies such as biogas can have on the impact of climate change.

Register for your FREE delegate pass

Presentation 2 - Biogas project financing needs 09h30-09h50 SAST

This session will feature **Jason Gifford**, the Chairperson of SABIA, as he provides insight into the activities of SABIA to make biogas projects more attractive to financing institutions.

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Presentation 3 - Investing in Biogas
A funder's viewpoint
09h50-10h10 SAST

Jonathan First, Managing Director
GFA Climate and Infrastructure (Pty) Limited,
will be providing a funders perspective on investing into biogas projects, as we uncover insights on what is meant by "technology being commercially viable", types of risks and the diversification of risk, and a potential approach that could be taken for biogas projects.

The last part of our workshop will provide an interactive session focusing on financing options for biogas projects. This session will also provide examples on when and how to identify potential financing for a biogas industry.

View the full programme HERE

CONSORTIUM PARTNERS

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Table 17. Agenda of the second LSW in South Africa

Time	Topic	Organisation	Person	Comments
09:00 - 09:10	Welcome and opening	GreenCape	Raldo Kruger	GreenCape to welcome audience to event. Welcome slide on background
09:10 - 09:30	Presentation 1 - Keynote speaker	African Development Bank	Dr Timothy Afful-Koomson	Keynote address - Add 5 mins for questions
09:30 - 09:50	Presentation 2 - Biogas project financing needs	SABIA	Jason Gifford	SABIA to present needs of biogas sector from financing sector - Add 5 mins for questions
09:50 - 10:10	Presentation 3 - Investing in Biogas - A funder's viewpoint	GFA Climate & Infrastructure (Pty) Limited	Jonathan First	A funder's viewpoint on investing in biogas projects - Add 5 mins for questions
BREAK (10:10 - 10:15)				
10:15 - 10:50	Plenary discussion - Current financing landscape in South Africa and its impact on biogas sector	GreenCape (Moderate)	Moderator: Jack Radmore Panelists: African Development Bank; NBI; SABIA;	20 mins - Guided questions and discussions 15 mins - Audience questions and discussions
BREAK (10:50 - 11:00)				
11:00 - 11:15	Presentation 4 - RSA identification of financing options report	GreenCape	Yaseen Salie	GreenCape to present the DiBiCoo identification of financing options report (D3.4)
11:15 - 11:35	Example - Identifying financing for a project (Interactive)	GreenCape	Yaseen Salie & Mandisa Mkhize (GreenCape)	Run through examples of identifying financing for projects at different stages - 10 mins each for 2 examples
11:35 - 11:50	Q&A	GreenCape	Yaseen Salie & Mandisa Mkhize (GreenCape)	Questions from audience with regards to the process
11:50 - 12:00	Next steps & closing	GreenCape	Yaseen Salie	GreenCape to close out event

6.2.2 Participants list

There were more than 119 participants who attended the virtual workshop on the Enlit Africa swapcard platform across the various presentations and engagement activities. The list of participants are as follows:

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Table 18. Participants of the second LSW in south Africa

No	Full name	Company
1	TR	University of Venda
2	AA	PHED
3	AK	PPP Training Online (Pty) Ltd
4	AM	GreenCape
5	BM	West Africa Energy Program
6	BB	Clarion Events
7	CL	The Edit Lab
8	TM	Cgrob Industries Limited
9	DC	Heimdall
10	DB	Bio2Watt
11	EC	Gas for Africa
12	EI	Ikeja Electric PLC
13	FG	UhuruAfrica
14	GR	USHAURI AFRICA
15	HM	Celestron Technology Holdings
16	IM	eThekwini Municipality
17	JB	Cape Advanced Engineering
18	KK	ACE GROUP
19	lM	SANEDI
20	PM	Mbeya University of Science and Technology
21	NF	GreenCape
22	QE	iGREENs
23	RK	GreenCape
24	MRR	Boom Organix
25	SN	CEF
26	SD	Consultant
27	ST	personal
28	TS	GreenCape
29	TG	Baepi Mining Pty Ltd
30	TN	UNESCO
31	TM	EDC - EXPORT DEVELOPMENT CANADA
32	GNV	Daily Morning
33	YS	THE GREEN CAPE SECTOR DEVELOPMENT AGENCY
34	TR	University of Venda
35	AM	CKR Consulting Engineers
36	AT	CAE
37	AM	GreenCape
38	BO	Water Utilities Corporation
39	BB	Clarion Events
40	BM	Inkunzi Emnyama Holdings
41	CH	Clarion Events Africa

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42	DA	Selectra cc
43	DC	Heimdall
44	LD	Pensioner
45	DR	Selectra
46	DK	Dwight Kee (Pty)Ltd
47	EHI	Partners for Innovation
48	EC	Gas for Africa
49	FB	LANDIS+GYR (PTY) LTD
50	FG	UhuruAfrica
51	GB	Camfil Power Systems
52	GN	Allen & Overy
53	HC	Hc construction & consulting engineers
54	NG	Siphalo Petroleum
55	IM	eThekwini Municipality
56	MS	ProGreen Solar Limited
57	JC	Clarion Events
58	JC	GIZ
59	LK	Transport Planning and Policy Development - Intern.
60	JB	Cape Advanced Engineering
61	KK	ACE GROUP
62	GD	Kwa-Sisonke Freight Logistics
63	LAM	EIB
64	LE	INTOLJPI WNVIRON MANAGEMENT SYSTEMS
65	IM	SANEDI
66	MM	GreenCape
67	EM	MBUBE DESIGN
68	MN	OREEGENICS
69	MM	Sanparks
70	NF	GreenCape
71	NP	ESI Africa
72	NM	Mainstream Renewable Energy
73	NB	Groupe Gbh
74	OM	Senior Brother Co. LTD
75	PC	Clean Energy Company
76	QE	iGREENs
77	RK	GreenCape
78	RT	RODIC CONSULTANTS PVT LTD
79	MRR	Boom Organix
80	AB	SABIA
81	TS	GreenCape
82	TG	Baepi Mining Pty Ltd
83	TN	(UNESCO) United Nations Educational Scientific and Cultural Organization
84	TM	Babcock International Africa

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85	TS	Clarion Events
86	TM	EDC - EXPORT DEVELOPMENT CANADA
87	TG	Clarion Events Africa
88	TW	Emergent Power & Energy Development LLC
89	VK	COMMONWEALTH SECRETARIAT
90	VM	Public Investment Corporation
91	WJ	Clarion Events-Africa
92	XM	EDF Renewables
93	YS	THE GREEN CAPE SECTOR DEVELOPMENT AGENCY
94	TR	UNESCO
95	KK	ACE GROUP
96	AR	AGR Power Africa
97	DG	AIC - Ecuador
98	TG	Baepi Mining Pty Ltd
99	NM	Bleh
100	AT	CAE
101	GB	Camfil Power Systems
102	VK	COMMONWEALTH SECRETARIAT
103	SDV	Consultant
104	GNV	Daily Morning
105	ED	Edgar Siza Investments
106	NPZ	ESI Africa
107	AM	GreenCape
108	TS	GreenCape
109	MM	GreenCape
110	RK	GreenCape
111	DC	Heimdall
112	NT	N/A
113	EH	Partners for Innovation
114	ST	personal
115	GO	Power Holding Company Nigeria-PHCN
116	DR	Selectra
117	DA	Selectra cc
118	CL	The Edit Lab
119	YS	THE GREEN CAPE SECTOR DEVELOPMENT AGENCY

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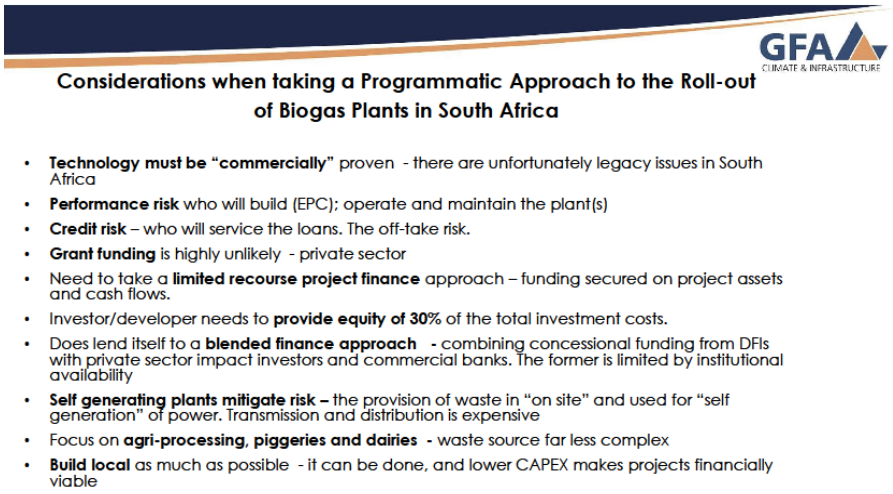
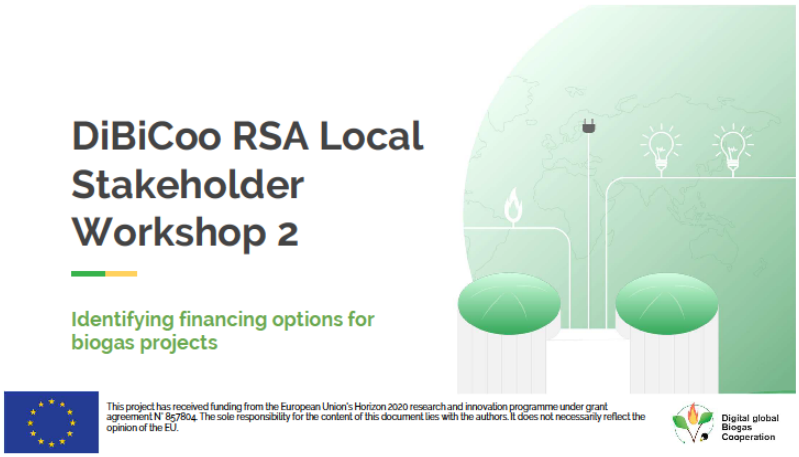
6.2.3 Presented Materials



GFA CLIMATE & INFRASTRUCTURE

Considerations when taking a Programmatic Approach to the Roll-out of Biogas Plants in South Africa

- **Technology must be "commercially"** proven - there are unfortunately legacy issues in South Africa
- **Performance risk** who will build (EPC); operate and maintain the plant(s)
- **Credit risk** – who will service the loans. The off-take risk.
- **Grant funding** is highly unlikely - private sector
- Need to take a **limited recourse project finance** approach – funding secured on project assets and cash flows.
- Investor/developer needs to **provide equity of 30%** of the total investment costs.
- Does lend itself to a **blended finance approach** - combining concessional funding from DFIs with private sector impact investors and commercial banks. The former is limited by institutional availability
- **Self generating plants mitigate risk –** the provision of waste in "on site" and used for "self generation" of power. Transmission and distribution is expensive
- Focus on **agri-processing, piggeries and dairies** - waste source far less complex
- **Build local** as much as possible - it can be done, and lower CAPEX makes projects financially viable



DiBiCoo RSA Local Stakeholder Workshop 2

Identifying financing options for biogas projects

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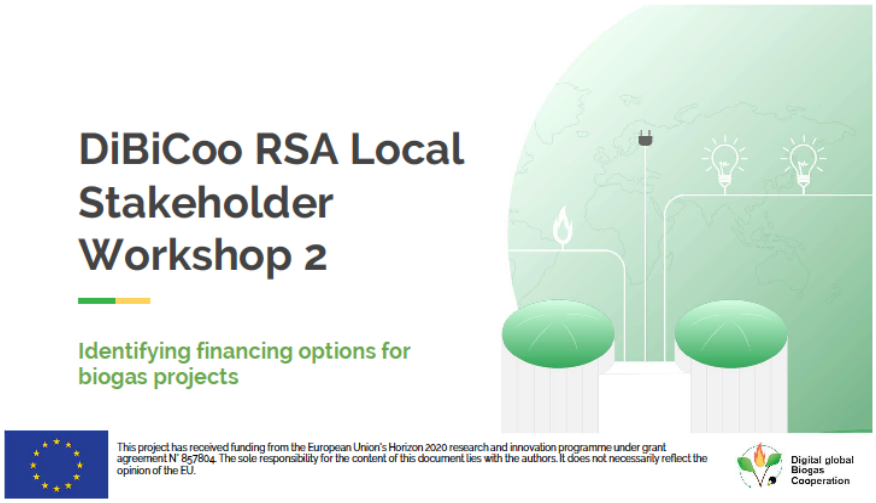
Digital global Biogas Cooperation



6.2.4 Notable Highlights of the Workshop

As part of the DiBiCoo project, the 2ndt local stakeholder workshop within South Africa was focused on sharing and validating the information compiled in Deliverable 3.4 - Biogas Financing Options in Argentina, Ethiopia, Ghana, Indonesia, and South Africa with an emphasis on the South African section. The workshop was divided into two primary sessions, viz. the presentation session and practical application session.

6.2.4.1 Presentation session

The workshop was opened with Dr Timothy Afful-Koomson of the African Development Bank as the keynote speaker. Dr Afful-Koomson highlighted the current trends and future of climate finance landscape and the potential impact that developing African biogas and green economy technologies could have. He set the scene on available financing and how to identify where investments and financing needs to be allocated.

The first presentation was delivered by Jason Gifford, the chairperson for the Southern African Biogas Industry Association. He provided an overview and market potential and opportunity of the South African biogas market. In addition, Jason highlighted the current challenges that the biogas market faces in identifying financing to develop projects and difficulties and negative perception that legacy projects has caused current projects being developed.

The second presentation was delivered by Jonathan First providing an investor perspective of investing in biogas. He highlighted the considerations that project developer needs to take within the local context of South Africa to successful secure finance for a bankable biogas project.

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The presentation session was closed out with a panel discussion with all the speakers. The focus of the panel discussion was to unpack the current financing landscape in South Africa and its impact of the biogas sector. It was summarized that although that there is financing available, accessing that finance is highly dependent on the ability of the business case for biogas to address the risks and concerns of financing stakeholders. The project development phase of biogas projects carries a higher perceived risk and therefore has less financial mechanism available to project developers. However, it was highlighted by the panel that should a project developer de-risk a project to an acceptable level, investors have no issue investing in the development and implementation of biogas projects within South Africa.

6.2.4.2 Practical session

The practical component was conducted by Yaseen Salie and Mandisa Mkhize. It started with a presentation providing an overview Deliverable 3.4 - Biogas Financing Options in Argentina, Ethiopia, Ghana, Indonesia, and South Africa with an emphasis on South Africa. The content and insights presented were used to provide two practical examples on how a project developer would identify financing required for the project. The case studies focused on an agriculture and agri-processing based project and a municipal waste management-based project both of which are considered as ideal biogas projects that could be developed in South Africa.

6.2.4.3 Closing remarks

The workshop was closed out by Yaseen Salie highlighting next steps and upcoming activities that the DiBiCoo project would be conducting within South Africa.

6.2.5 Workshop Evaluation

6.2.5.1 What went well

Continuing the successful implementation of the first LSW, the second LSW in South Africa again was conducted through Enlit Africa. In terms of substance, it allowed for the demonstration of Deliverable 3.4 and promote the biogas sector to the financial service institutions. The workshop was well received based on the level of engagement we received over the duration of the workshop planning, delivery and post event activities. A web analytics summary was provided by the service provider who assisted in hosting the virtual workshop on the swap card platform. Seen from figure below the web analytics breakdown diagram, number of users and page views on DiBiCoo and the second LSW platform significantly increased compared to the previous LSW. The use of Enlit Africa also expanded LSW exposure globally even the countries outside DiBiCoo partners.

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Figure 21. Participant structure of the second LSW in South Africa

6.2.5.2 Points need improving

As financing was highlighted as a barrier to the biogas sector in South Africa, thus being the topic of the second LSW, the attendance of stakeholders from financial institutions was still not as much as expected. Improvement in publishing activities at the planning stage revealed vital to ensure the targeted participants are achieved. In addition, both LSW in South Africa, although there was good interaction during the workshops, there was little to no feedback received through the online evaluation form. There was no change even though the evaluation form was highlighted more in the closing of the second LSW. It may be that for future virtual activities, time is allocated in the programme to specifically complete an evaluation/feedback form.

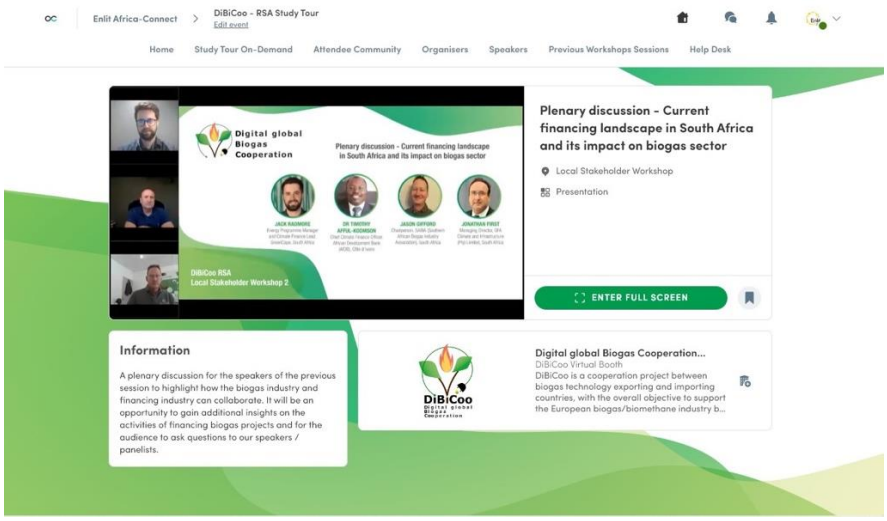

Figure 22. Enlit Africa platform for the second LSW in South Africa

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DiBiCoo Consortium Partners

Coordinator

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Partners from exporting countries

WIP RENEWABLE ENERGIES

AUSTRIAN ENERGY AGENCY

EBA European Biogas Association

kompost & biogas verband

Fachverband BIOGAS German Biogas Association

Latvia University of Life Sciences and Technologies

Partners from importing countries

INTA Instituto Nacional de Tecnología Agropecuaria

SELECTRA WASTE • WATER • BIOENERGY

iceaddis innovation . collaboration . entrepreneurship

GreenCape

rdi Resilience Development Initiative

SEES INSTITUTE FOR SUSTAINABLE ENERGY AND ENVIRONMENTAL SOLUTIONS

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Digital global Biogas Cooperation

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