



April 2021 –  
March 2022

# Annual Report



Prepared by: NZMATES PMO

Prepared for: NZ MFAT

April 2021 – March 2022

*Cover photo: NZMATES staff and training participants at a training workshop on introduction to renewable energy with teachers from four Vocational High Schools in Ambon.*

## LIST OF ACRONYMS

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<b>ADB</b>	Asian Development Bank
<b>AFD</b>	Agence Francais de Developpement (French Development Agency)
<b>Bappeda</b>	Badan Perencanaan Pembangunan Daerah (Maluku Development Planning Board)
<b>BLK</b>	Balai Latihan Kerja, Vocational Training Centre
<b>BPS</b>	Badan Pusat Statistik (Maluku Statistics Board)
<b>CIP</b>	Climate Investment Platform
<b>DAK</b>	Dana Alokasi Khusus (Special Allocation Funding)
<b>DJ EBTKE</b>	Direktorat Jenderal Energi Baru Terbarukan dan Konservasi Energi (Directorate General for New and Renewable Energy and Energy Conservation)
<b>Dinas ESDM</b>	Dinas Energi dan Sumber Daya Mineral (Energy and Mineral Resources Agency)
<b>EBT</b>	Energi Baru dan Terbarukan (New and Renewable Energy)
<b>FOP</b>	Forward Operating Plan
<b>GCF</b>	Green Climate Fund
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Development Agency)
<b>HSS</b>	Health, Safety and Security
<b>IPP</b>	Independent Power Producer
<b>IRENA</b>	International Renewable Energy Agency
<b>LEAP</b>	Low Emissions Analysis Platform
<b>LOP</b>	Life of Programme
<b>MEL</b>	Monitoring, Evaluation and Learning
<b>MFAT</b>	Ministry of Foreign Affairs and Trade
<b>MLIN</b>	Maluku Lumbung Ikan Nasional (Maluku National Fish Barn)
<b>MMU</b>	Maluku dan Maluku Utara (Maluku and North Maluku Provinces)
<b>MP</b>	Maluku - Papua
<b>NZMATES</b>	New Zealand – Maluku Access To Renewable Energy Support
<b>PA</b>	Project Agreement
<b>PLN</b>	Perusahaan Listrik Negara (National Electricity Company)
<b>PM</b>	Programme Manager
<b>PMO</b>	Programme Management Office
<b>PSG</b>	Programme Steering Group
<b>RBL</b>	Results-based lending
<b>RE</b>	Renewable Energy
<b>Renstra</b>	Rencana Strategis (Strategic Plan)
<b>RPJMD</b>	Rencana Pembangunan Jangka Menengah Daerah (Medium-Term Regional Development Plan)
<b>RUED</b>	Rencana Umum Energi Daerah (General Provincial Energy Plan)
<b>SMK</b>	Sekolah Menengah Kejuruan (Vocational High School)
<b>Sulmapana</b>	Sulawesi, Maluku, Papua and Nusa Tenggara
<b>TC</b>	Technical Committee
<b>UP3</b>	Unit Pelaksana Pelayanan Pelanggan (Customer Service Delivery Unit)
<b>YMCI</b>	Yayasan Mercy Corps Indonesia

## EXECUTIVE SUMMARY

This annual report corresponds to the fourth year of the NZMATES programme, from 1st of April 2020 to 31st March 2022. During this period activities continued to be disrupted by the covid pandemic, and the focus remained on desk studies and online engagement for most of the year.

The NZMATES team continued to work on a large number of pre-feasibility studies for off-grid and hybrid solar PV sites for PLN, as well as methodologies for evaluating IPP projects, support for EBTKE's rooftop solar programme, and strategic planning support for both PLN and Dinas ESDM. Training and mentoring activities continued, and the Pūngao Pattimura Mini-Grid Training Lab was installed at Pattimura University despite ongoing pandemic restrictions. NZMATES also ramped up fund-seeking activities, developing concept notes for the GCF, support requests for IRENA's CIP, proposals for the Indonesian Government's DAK fund, and ongoing support for PLN in accessing its own budget allocations and IPP programmes.

The delta variant swept through Indonesia in mid-2021 impacting staff availability, and several key NZMATES team members resigned to take up work closer to their homes and families outside of Ambon. This led to a restructure of the programme management and technical teams, with a new Jakarta-based Technical Manager being appointed, as well as two local Junior Engineers from Ambon.

In late 2021 and early 2022, the NZMATES team managed to progress from online activities to field travel and face-to-face training by the end of the reporting period. In February 2022 the first field visit in over two years was conducted to scope locations for solar mini-grids to support the fishing industry for potential DAK funding.



*Figure 1: NZMATES team members speaking with local officials in Aru Regency in February 2022. This was the team's first field visit in over two years.*

# 1 KEY ACHIEVEMENTS AND PROGRESS

## 1.1 Results framework

NZMATES conducted its usual annual result framework review, and only three minor changes were recommended this year, approved by MFAT and endorsed at the PSG meeting. Unlike previous years, changes proposed this year do not change structure of the framework but focused on minor adjustments to indicators and life of programme (LOP) targets. The current result framework and summary of changes in 2021 is presented in Figure 2.

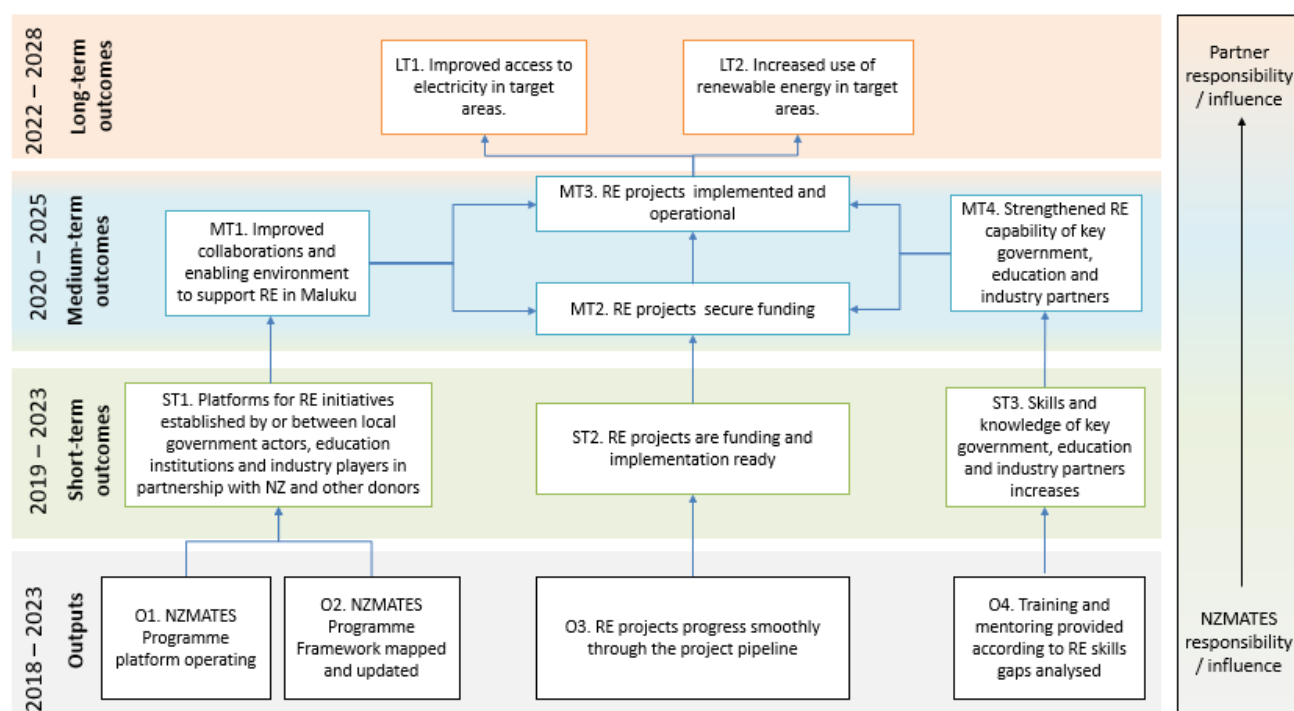


Figure 2: Current version of NZMATES results framework

The first change was to add a new indicator under output *O3. Renewable energy projects progress smoothly through the project pipeline*. The new indicator is *O3.3 Number of RE projects or initiatives appraised for potential inclusion in the pipeline*. The indicator was proposed to capture the large number of scoping/pre-feasibility studies conducted by NZMATES.

Secondly, the definition of indicator O3.2 was updated to reflect the fact that many reports delivered to partners were approved informally through regular catch-ups, working group meetings, or WhatsApp communication.

The last change proposed this year is LOP Target adjustment for indicators O1.5, ST1.1, and O4.1. Details of this adjustment is presented in **Table 2**.

Table 1. Adjustment of definition for indicator O3.2

	Level	Performance Indicator	Definition
<b>Previous definition</b>	Output O3.2	Number of assessment results, studies, or surveys to support RE projects that sent and approved by partners.	Number of results of RE project assessments, studies or surveys conducted by qualified professionals. The document must meet the requirements and standards needed to get partner approval at the TC or PSG meeting.



<b>New definition</b>	Output O3.2	Number of RE project documents (assessments, reports, studies, surveys, or proposals) prepared project progress through the pipeline with partner’s approval.	Number of assessment documents, studies or surveys approved by partners to be carried out by professionals. The document must meet the requirements and standards needed to get partner approval at the progress/catch-up meeting.
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**Table 2. LOP Adjustment for NZMATES Indicators**

Indicators	Previous LOP Target	New Target	Justifications
O1.5. Number of TC meetings that are well-attended and produce clear outcomes	16	9	TC meetings reduced to once every 6 months, with informal progress update in between
ST1.1. Number of project assistance requests from private sector, government, or community	20	115	Increased as target exceeded. Current project requests: 109
O3.3. (NEW) Number of RE projects or initiatives appraised for potential inclusion in the pipeline	-	60	New indicator
O4.1 Number of people who receive training and/or mentoring through NZMATES	60	350	Increased as target exceeded. Current training participants: 256



*Figure 3: NZMATES Programme Manager Safitri Baharuddin speaks about renewable energy at a public celebration at Pattimura University's Faculty of Law*

## 1.2 Delivery of Outputs

### Output 1: Programme Platform Operating

The following sections summarise progress in the key sub-areas of Output 1.

#### *Programme Management Office*

No.	Indicator	Year 1	Year 2	Year 3	Year 4	LOP <sup>1</sup> target
<b>01.1</b>	Qualified PMO team in place	Yes	Yes	Yes	Yes	Yes
<b>01.2</b>	PMO has sound, relevant procedures and policies in place, approved by Programme Manager and updated annually.	Yes	Yes	Yes	Yes	Yes

NZMATES personnel worked from home during most of this period, but gradually started returning to the office in early 2022. As covid infections in Maluku and throughout Indonesia declined, restrictions were gradually lifted and NZMATES team members returned to Ambon. At the time of writing this report the team are operating in a hybrid manner, with numbers of staff entering the office each day limited in line with Indonesian government regulations.

In April 2021 NZMATES Programme Manager Mauricio Solano Peralta resigned, and Deputy Programme Manager Safitri Baharuddin stepped up to take on the Programme Manager role, leading overall programme oversight and strategy as well as increasing responsibility for stakeholder relationships and supervision of the programme team.

Kitty Garden moved into a new Programme Advisor role, with less direct involvement in capacity building and MEL tasks, and increased involvement in budget and resource management and liaison with MFAT.

A new Technical Manager role was created, to lead the NZMATES Technical Team, conduct high-level technical engagement (especially with PLN) and support strategic direction for the project pipeline. Recruitment for this role proved challenging, but in August 2021 Nicholas Simanjuntak took on this role, and was contracted through Infratec. Nicholas brings over 10 years of experience in the renewables sector, from a private company perspective as well as development programmes under GIZ and UNDP.

Unfortunately, 2021 also saw the resignation of both Renewable Energy Technical Specialists (RETS), Kurnia Setiawan and



*Figure 4: NZMATES' two Renewable Energy Junior Engineers participate in an Instagram Live interview with support from RETS Usep Nuraen.*

<sup>1</sup> Life of Programme target – target for end of NZMATES programme in June 2023

Maryam Karimah, who took on new opportunities to work closer to their families in Jakarta during the pandemic. Two new RETS were hired: Slamet Andri Murtopo and Usep Nuraen.

In order to further strengthen the NZMATES technical team, and to help build up local technical expertise in Maluku, NZMATES also took on two young women recent engineering graduates from Maluku on a four-month internship programme: Putri Anjani Hatuina and Maharani Sarah Holle. Both have provided valuable contributions to NZMATES during their internships and have agreed to join NZMATES on a permanent basis.

Infratec Engineers Mansoor Shah, Cillian Walker and Andrew Crossland provided extra support virtually during the transition to the new programme management and technical team structure. Consultant Amran Mohamad, who has over 10 years of experience in Indonesia’s solar energy sector, was also brought on as a part-time Technical Advisor.

2021 also saw the resignation of Senior Communications Officer Seruni Putri Soewondo, who was replaced by Frida Rahmita Gultom in September 2021. NZMATES also recruited Jean Latumahina into the role of Senior Finance and Admin Officer, which had remained vacant since early 2020, and Shendy Sofyan Raiman into the new role of Senior Programme Administrator.

Despite the challenges of staff departures, NZMATES continued to provide extra support for staff while working from home, including an electricity subsidy, online training opportunities, and weekly online self-care and team-building activities, which range from exercise to cooking and informal discussions. Health and safety continued to be a key focus, and with the return of field travel and face-to-face activities in February 2022, procedures were reviewed and updated to take account of new Covid-19-related requirements.



*Figure 5: Community Engagement Officer and H&S focal point Isra Amin conducts a temperature check on a participant before they enter NZMATES’ Introduction to Renewable Energy training for Vocational Highschool Teachers in January 2022.*

### ***Monitoring, Evaluation and Learning (MEL)***

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No.	Indicator	Year 1	Year 2	Year 3	Year 4	LOP target
<b>01.3</b>	Results framework reviewed annually and endorsed by PSG.	Partial	Yes	Yes	Yes	Yes

MEL activities continued to be conducted mainly online. As discussed above, the third review of the results framework was completed with acceptance of the updated framework at the PSG meeting in November 2021.

NZMATES continued to conduct regular internal reflection meetings, including 6-monthly FOP reflection workshops, and monthly “mini-reflection” sessions where team members virtually shared challenges and achievements from the past month. These sessions helped to identify any adaptations needed to FOP tasks or approaches within the team.

The second annual reflection with partners process was started in February 2022 following a similar methodology to the previous year – see Section 3 for more detail.

The programme’s mid-term review was due to be conducted during this year, however MFAT requested to further postpone it until late 2022 due to ongoing Covid restrictions. In the meantime, NZMATES will conduct a special study on partners story of change during FOP 9 in order to obtain independent data on some of the programme’s qualitative indicators.

### ***Stakeholder Engagement and Programme Governance***

No.	Indicator	Year 1	Year 2	Year 3	Year 4	LOP target
<b>01.4</b>	Number of PSG meetings that are well-attended and produce clear outcomes.	0	2	3	5	9
<b>01.5</b>	Number of TC meetings that are well-attended and produce clear outcomes.	1	3	4	6	9

During the reporting period activities continued to be mostly virtual, however some face-to-face engagement became possible in early 2022. NZMATES 5<sup>th</sup> Technical Committee meeting was held in April 2021, and the 6<sup>th</sup> in October 2021. Both were online. The 4<sup>th</sup> Programme Steering Committee meeting was also held online in May 2021, and the 5<sup>th</sup> in November 2021.

There were several important changes in key personnel at partner institutions during the past year. In April 2021 NZMATES had the opportunity to engage with the new Director of Various New and Renewable Energy at **EBTKE**, Chrisnawan Anditya. However, he was later replaced with Andriah Feby Misna, who the NZMATES team met with in March 2022, introducing her to the programme and hearing her thoughts on how NZMATES can continue to support EBTKE’s work. Ibu Feby was previously Director for Bioenergy.

**PLN** also had some important changes, with a new Regional Business Director of Sulawesi, Maluku, Papua, and Nusa Tenggara instated in late 2021, Mr. Adi Priyanto.

Another major change was the election of a new Dean of the Engineering Faculty at **Pattimura University** in late 2021. Former Dean Ir. Wolter R. Hetharia had been a key NZMATES collaborator since the very beginning of the programme, and collaborations with the Engineering Faculty are vital to ensure the sustainability of capacity building initiatives. NZMATES was able to meet with the new Dean, Dr. Pieter Th. Berhutu, in early 2022, and looks forward to continuing to collaborate closely in the final years of the programme.

Finally, there were also some changes in personnel at **Dinas ESDM**, starting with the Head of Dinas ESDM retiring at the end of November 2021. Said Latupono, Head of the Energy Division and close



collaborator of the NZMATES programme, has been assigned to temporarily fill this position. Finally, the position of Head of the Electricity Division was filled by Julius Madeten. This role had remained vacant since the passing of the late Muchtar Bakri in late 2019.

NZMATES also held its own panel discussion at **IndoEBTKE ConEx** on mini-grid sustainability. NZMATES MEL and Reporting Specialist, Dintani Naimah, was joined by Imam Askolani, from GIZ, and Desmon Simatupang, an academic who had recently published a paper on technologies for solar mini-grid sustainability in Maluku. The event was well-attended by representatives from government, private sector and education institutions, from both Maluku and elsewhere in Indonesia.

Finally, NZMATES has started discussions with partners on the establishment of a **Maluku Energy Stakeholder Forum**, to facilitate ongoing collaboration between the various parties involved in energy projects in the province. These discussions are at an early stage, with a draft SOW for the Forum currently under discussion with key stakeholders. More detail on the Forum, as well as on NZMATES various collaborations, can be found in Section 4.1

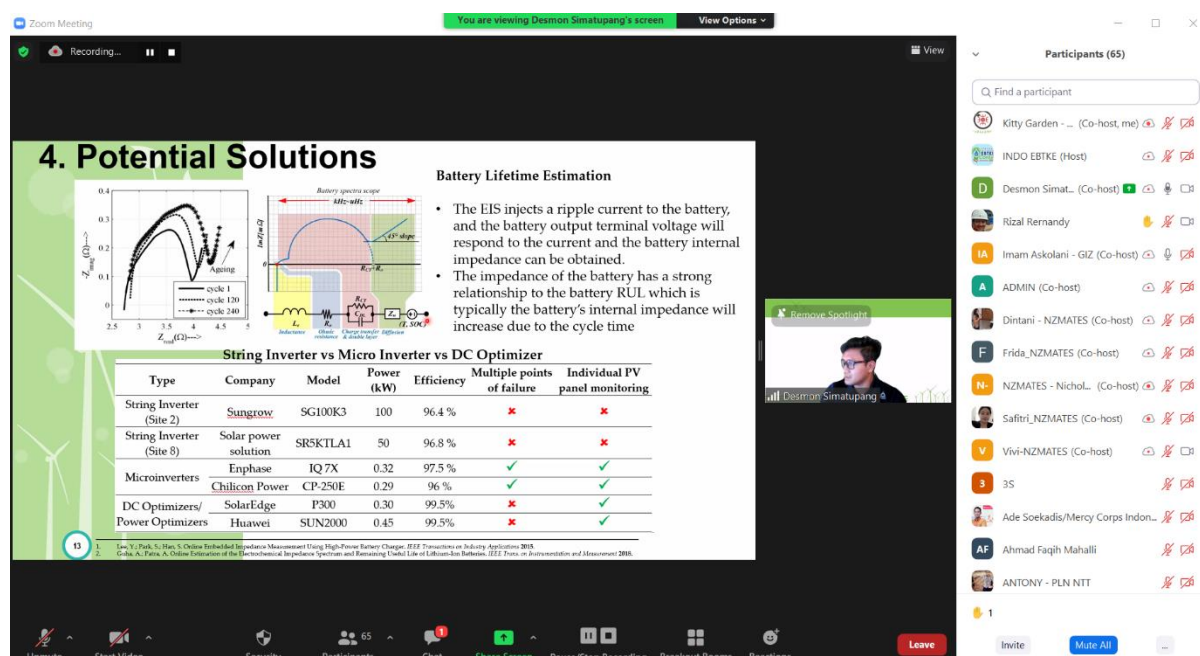


Figure 6: Researcher Desmon Simatupang presents the findings of his paper on micro-grid sustainability in Maluku at NZMATES' panel discussion at IndoEBTKE in November 2021.

## Output 2: Programme Framework Mapped and In Use

No.	Indicator	Year 1	Year 2	Year 3	Year 4	LOP target
<b>02.1</b>	Institutional framework mapping updated annually and approved by PM.	Partial	Yes	Yes	Yes	Yes
<b>02.2</b>	Technical framework analysis updated annually and approved by PM.	Partial	Yes	Yes	Yes	Yes
<b>02.3</b>	Financing, funding and grants catalogue updated annually and approved by PM.	Partial	Yes	Yes	Yes	Yes

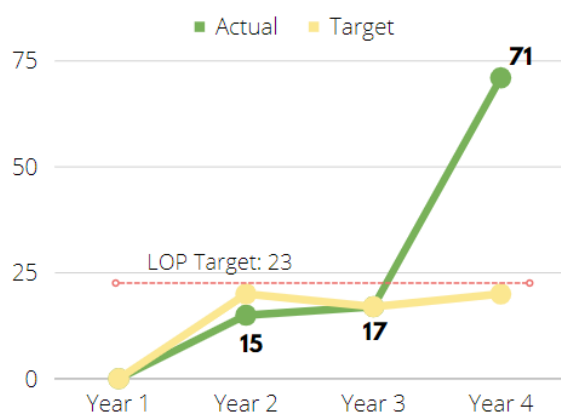
The NZMATES team has continued to keep framework deliverables up-to-date, compiling and analysing new information on regulations, cross-cutting issues, electrification plans and technologies. NZMATES continued to support PLN with its 5-year electricity planning towards meeting the 23% RE target by updating plans with new information on IPP projects.

In addition, NZMATES continued to support the **finalisation of Maluku's RUED**, with the consultant conducting another round of training in use of the LEAP software, updating the draft RUED documents and conducting consultation with the National Energy Council. When the new PLN RUPTL was released in late 2021 this was incorporated and the final draft. The final step of public dissemination was delayed due to fluctuating Covid cases and restrictions that prohibited the RUED consultant's travel from Jakarta to Ambon. However, the RUED document and academic paper have now been submitted to Maluku's legislature to be formalised with a provincial regulation. Currently, the provincial regulation has been enacted and is awaiting approval from the Governor of Maluku.

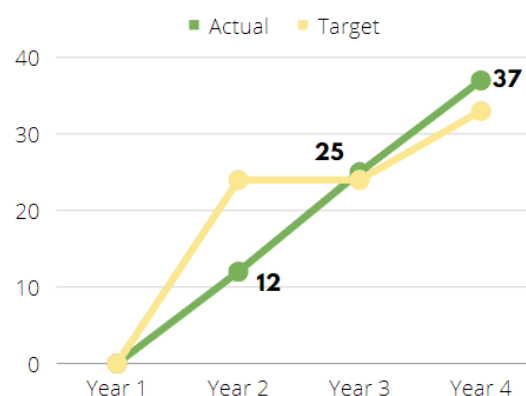
NZMATES also conducted its first **Women in Energy Initiative** in June – July 2021. The initiative aimed to investigate women's perspectives on the energy sector, specifically in Maluku Province, to enable NZMATES to develop strategies to provide better assistance for women professionals and students. As a follow up to this initiative, NZMATES is preparing to contract a consultant to conduct a more comprehensive study on barriers and opportunities for women's participation in the energy sector in Maluku. For more information see Section 3.2

## Output 3: RE projects progress smoothly through the project pipeline

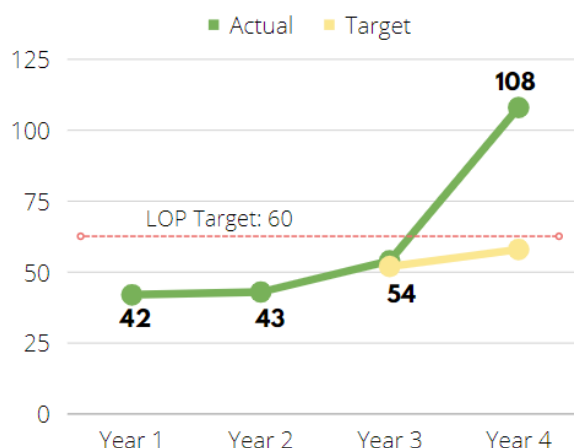
**03.1** Number of RE projects in the NZMATES pipeline that have made progress towards funding.



**03.2** Number of RE project documents made to support the progress of RE projects through the NZMATES pipeline with partner approval



### 03.3 Number of RE projects or initiatives appraised for potential inclusion in the pipeline<sup>\*)</sup>



<sup>\*)</sup> New Indicator

Despite the challenges of the pandemic situation, installation of the **Pūngao-Pattimura Mini-Grid Training Lab** at Pattimura University was able to proceed with strict health protocols in place, and the 5.67 kWp PLTS with 15.36 kWh BYD battery was commissioned in April 2021. Unfortunately, due to the worsening pandemic situation after this, the inauguration event for the lab has been postponed. The election of a new Dean of the Engineering Faculty in late 2021 caused some additional delays, as the new Dean was brought up to speed on the collaboration with NZMATES and the solar lab in particular.

The refurbishment of the **Pulau Tiga PLTS** with PLN faced some challenges during this reporting period, mainly related to the procurement process. Initially the tender process was postponed due to pandemic conditions, and later some difficulties emerged regarding the administrative processes around eventual transfer of the asset to PLN and the payment of associated costs. These issues have been discussed in depth with various stakeholders and at the time of writing this report, a Project Agreement is awaiting final signature by PLN's Regional Director Adi Priyanto.

Following on from a large number of pre-feasibility studies conducted during FOP 6, in FOP 7 PLN asked NZMATES' technical team to support with developing full feasibility studies for 52 of the sites with potential for **hybridising diesel mini-grids with solar and energy storage**. NZMATES technical team provided training to PLN MMU and UP3 staff in how to conduct these feasibility studies, and mentored them through the process of finalising these studies, as well as studies for 45 additional sites in North Maluku. These studies were submitted to PLN Pusat for inclusion in PLN's upcoming plans. Four of the sites are now included among the 20 to be implemented under IPP arrangements in the national **diesel replacement programme** in 2022, while another site will be implemented directly by PLN in 2022. The remaining sites are pending budget allocation for future years.

Dinas ESDM requested support from NZMATES to identify potential renewable energy projects that would support the **Maluku National Fish Barn** (Maluku Lumbung Ikan Nasional, MLIN) initiative, and could be eligible for funding through the **National Government's Special Allocation Fund (Dana Alokasi Khusus, DAK)**. NZMATES coordinated discussions between Dinas ESDM, PLN and the Maluku Maritime & Fisheries Office to identify sites that could benefit from village-level solar mini-grids to improve electricity access in remote island locations where fisheries are the main livelihood activity. Four potential sites were identified, and NZMATES travelled with Dinas ESDM in February 2022 to gather data from the sites. At the time of writing the report the proposals were being finalised for submission for DAK funding in April 2022. It is important to note that, while mini-grids funded previously under the DAK programme have faced sustainability challenges, the goal would be for the DAK funding to sustain

the electricity service via mini-grid until PLN enters the location and can take over management and ownership of the mini-grids. The sites are all included in PLN's electrification plans but are not due to be electrified until 2024 at the earliest.

NZMATES prepared two **concept notes for Green Climate Fund (GCF) funding** for PLN for 11 hybrid PLTS sites and 6 PLTS refurbishment sites which were submitted through the national call for concept notes. PT SMI expressed an interest in working as Accredited Entity for the concept notes, and through discussions the concept has evolved from direct project funding to a financing framework administered by PT SMI with PLN hybrid sites included in the pipeline of projects to be funded, along with two sites proposed by PLN subsidiary Indonesia Power.



*Figure 7: RETS Maryam Karimah giving a virtual training to PLN on preparing hybrid solar PV and BESS feasibility studies in August 2021.*

NZMATES also supported PLN with **IPP PLTS project proposals** during the past year. After conducting feasibility studies for two IPP PLTS projects in Bula and Namlea, NZMATES developed guidelines for PLN in evaluating feasibility of IPP projects. These guidelines were presented to PLN in workshops with PLN MMU and PLN EBT. The guidelines will be used as a basis for mentoring PLN through the process of evaluating feasibility of new proposed sites in 2022.

Other projects that NZMATES worked on during the past year include:

Guidelines and SOP on PLTS waste management were finalised and shared with Provincial stakeholders. Dissemination with regency-level stakeholders has been on hold pending the covid situation, but will be conducted during FOP 9.

Guidelines on Mini-Grid Sustainability were finalised and shared with Provincial Stakeholders, then disseminated nationally during IndoEBTKE ConEx in November 2021. The guidelines are currently being translated into Bahasa Indonesia.

A concept note for a rooftop installation for a fisheries cold storage company was submitted to MFAT for discretionary budget funding, however the company requested that the project be put on hold due to the economic impacts of the pandemic and their inability to invest in co-funding the solar installation at this time.

A discretionary budget proposal to develop and pilot a cloud-based O&M platform in 10-20 remote PLN sites was approved by MFAT. The procurement process for this project was put on hold but has been re-activated in early 2022 and a project agreement is under development with PLN.



NZMATES submitted two projects to the IRENA Climate Investment Platform for potential funding and assistance. One is for implementation fund-matching for 10 PLN hybridization locations, and the other is a request for technical assistance for 28 off-grid locations for PLN's village electrification. Currently, the projects are under assessment from IRENA.

Coordination with PLN and MENTARI on the national diesel replacement programme continues. Implementation of the first 20 sites in Maluku is scheduled for 2022 along with sites in North Maluku and Papua. MENTARI have stated that collaboration with NZMATES during the pre-FS and prioritisation stage led to an additional 51 sites in Maluku being included in the first phase of the programme.

Finally, NZMATES has continued to explore innovative financing options, such as impact investment through agencies like South Pole and Allotrope, and crowdfunding through platforms like Energise Africa, who are interested in expanding into Asia.



*Figure 8: NZMATES team leaving Kolaha Village, in Aru Regency, one of the sites visited for the DAK PLTS feasibility study, in February 2022.*

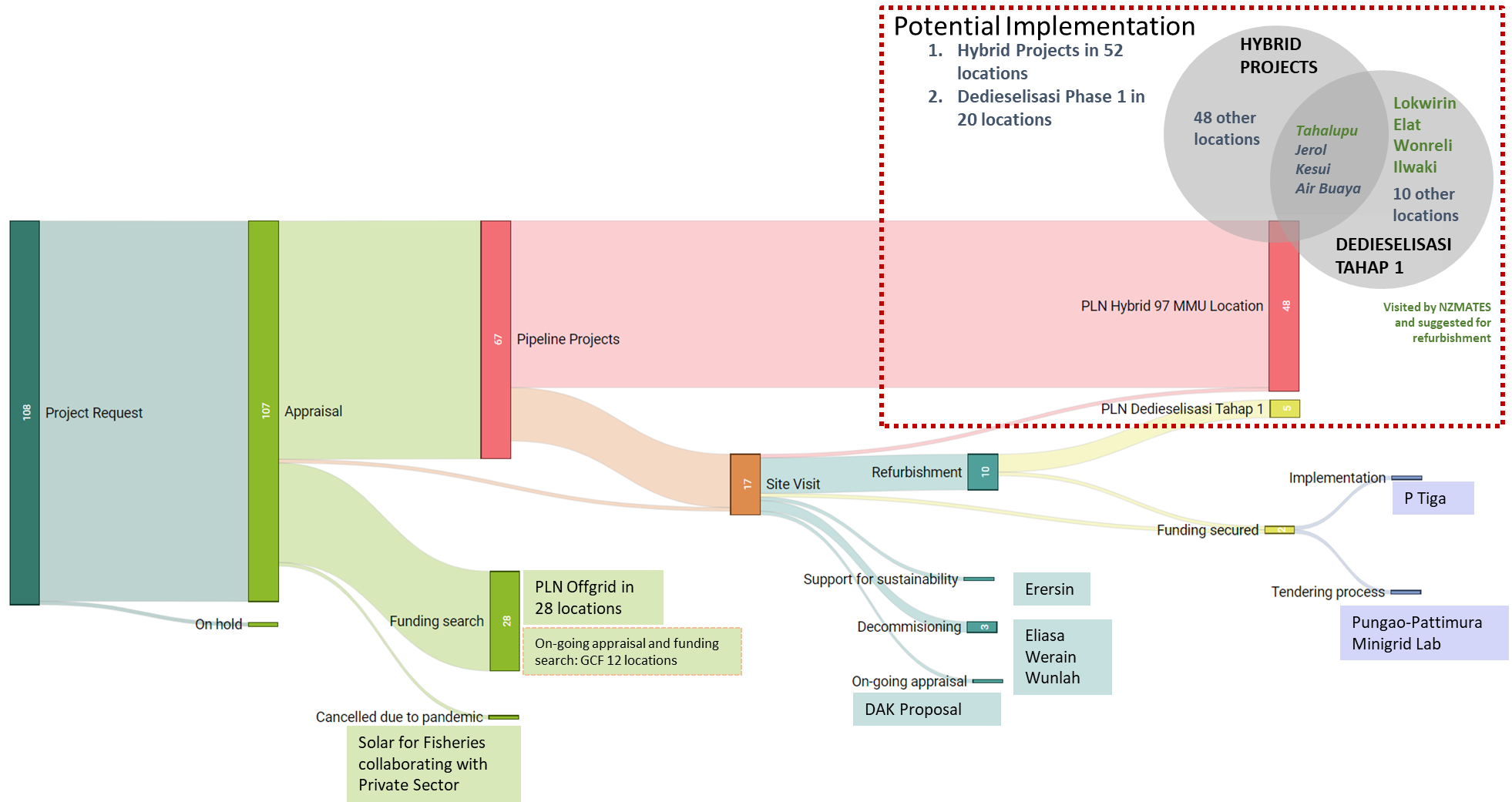
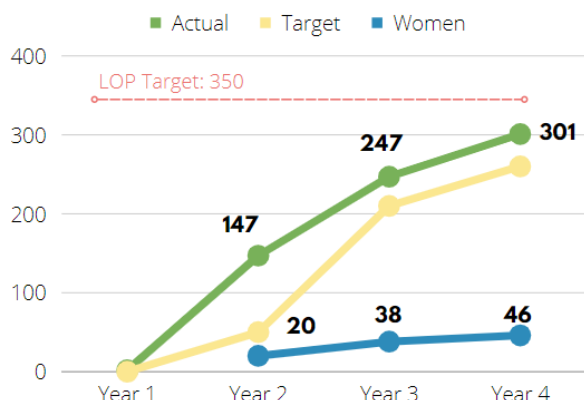


Figure 9: Sankey diagram summarising project pipeline progress from appraisal through to funding and implementation.

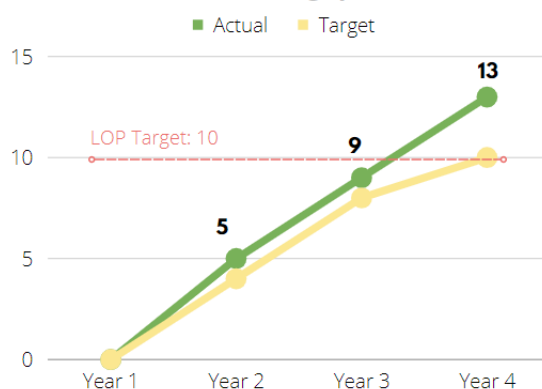
### Output 4: Training and mentoring provided according to RE skills gaps identified

The fourth year of implementation of the NZMATES programme was an active one for capacity building and mentoring.

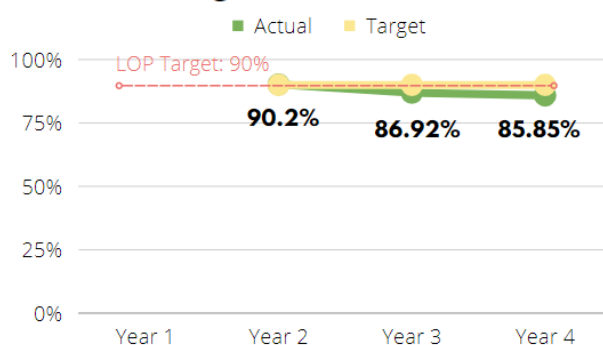
**O4.1** Number of people who receive training and/or mentoring through NZMATES



**O4.2** Number of training activities conducted aligned with identified skill gaps



**O4.4** Percentage of people reporting satisfaction with relevance of training



In 2021 NZMATES technical team supported PLN MMU and UP3 staff to prepare feasibility studies for 97 solar and battery hybridisation sites. This process involved providing initial online training on relevant software packages, and then an intensive mentoring process of the training participants to help them to finalise the feasibility studies following the required process and meeting quality standards. The studies produced under this process have been submitted for implementation under the Diesel Replacement and LisDes programmes.

Under the RUED consultancy, NZMATES consultant also provided training on use of the LEAP energy planning software for various provincial stakeholders, including Dinas ESDM, Bappeda and other relevant provincial government agencies.

In terms of support for education institutions, NZMATES provided online training to teaching staff at PNA in using PVsyst software and delivered a hybrid online/face-to-face training on RE for Electrical Engineering students in October 2021, and for Mechanical Engineering students in December 2021.

Collaboration with the RESD programme also allowed NZMATES to sponsor the participation of teaching staff from PNA and UnPatti in various training courses throughout the year, including training of trainers and certification courses in solar PV and hydro.

At UnPatti, basic operation and maintenance training was provided for laboratory staff by the EPC company who installed the solar PV system in the solar lab. Follow-up trainings in health and safety and in-depth operation and maintenance have unfortunately suffered delays, at first due to covid restrictions, and more recently due to personnel changes, including the election of a new Dean of the Engineering Faculty in late 2021, which has led to changes in the people involved in the NZMATES-UnPatti working group.

**O4.3** **Number of training arrangements established between Indonesian and NZ universities or other educational institutions**



Unfortunately, due to the ongoing pandemic challenges and the personnel changes mentioned above, no progress has been made in the past year in establishing training arrangements between Maluku and New Zealand educational institutions. This activity has been paused while urgent activities relating to the Solar Lab are finalised, to avoid making too many demands on UnPatti personnel’s time.

Outside of the Engineering Faculty, NZMATES was invited to participate in an event hosted by the Law Faculty to celebrate their anniversary, where an introduction to renewable energy was given by NZMATES RETS Usep Nuraen with support from REJE Putri Hatuina.

Finally, collaboration with Vocational Highschool SMK 4 progressed throughout the year, from the signing of an MoU with NZMATES in July 2021, when the school opened its first RE specialisation programme . NZMATES delivered a training workshop on RE for teachers from four different Vocational High-schools in Ambon, which received very positive feedback from participants. NZMATES its planning to conduct a workshop for students in the new RE specialisation programme in April 2022.



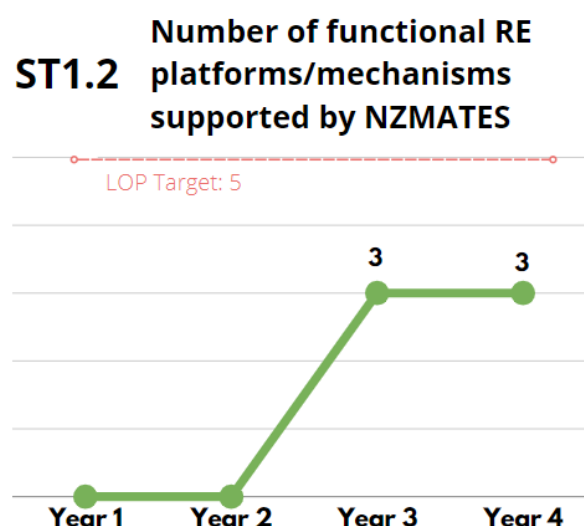
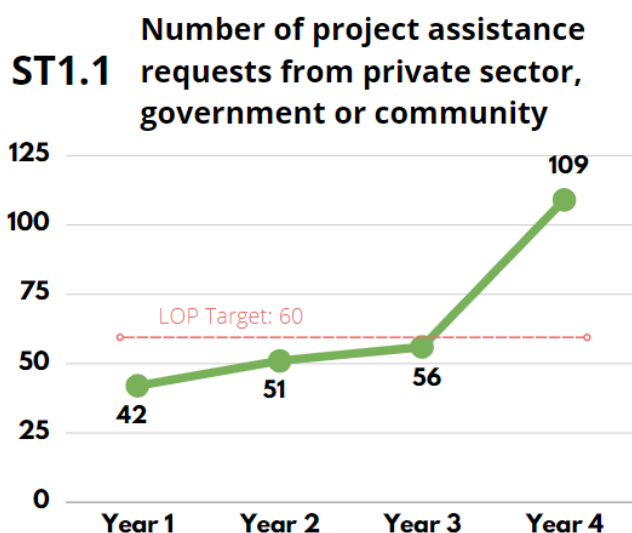
Figure 10: RETS Usep Nuraen and REJE Putri Hatuina give a demonstration of solar PV technology as part of the anniversary celebrations at UnPatti’s Law Faculty



### 1.3 Progress towards short-term outcomes

The fourth year of implementation of the NZMATES programme saw significant progress towards several of the short-term outcomes, despite the ongoing challenges of the continuing pandemic. The sections below provide more detail.

#### Short-term outcome 1: Platforms for RE initiatives established by or between local government actors, education institutions and industry players in partnership with NZ and other donors



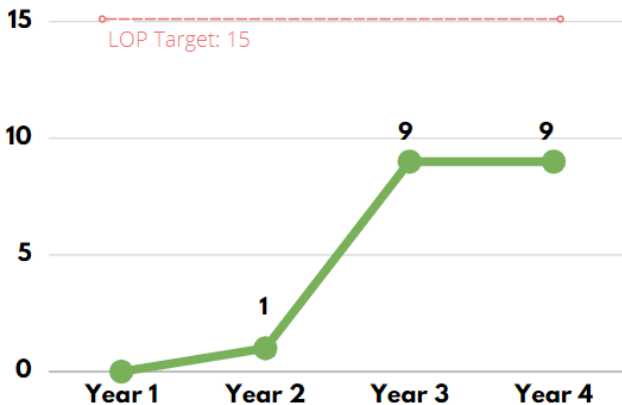
The number of project assistance requests received by NZMATES jumped significantly in the past year. This was mainly due to the 52 hybridisation sites which PLN requested NZMATES conduct feasibility studies for. In fact, the total number of FS requested was 97, however 45 of these were in North Maluku so are not included in indicator ST1.1 as they are out of NZMATES geographic scope. Instead of NZMATES conducting all the FS directly, NZMATES provided training and mentoring for staff from PLN MMU and UP3 and supported them to prepare the FS themselves. These FS have been submitted by PLN MMU to PLN Pusat for inclusion in upcoming RUPTL and implementation in coming years.

The other new project request received in the past year was from Dinas ESDM, who requested support in preparing FS and proposals for the funding of solar mini-grids for villages with strong potential in the fisheries sector, for potential funding under the Indonesian Government’s DAK programme, which has a focus on supporting fishing industry.

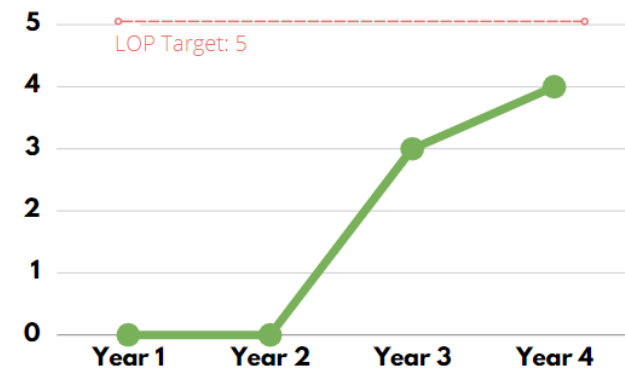
Regarding indicator ST1.2, there has been no change in the past year. NZMATES is currently in discussions with provincial-level partners on establishing the Maluku Energy Stakeholder Forum, which would be captured under this indicator once established.

**Short-term outcome 2: RE projects are funding and implementation ready**

**ST2.1** Number of off-grid projects meeting funding-ready criteria and/or ready to be implemented



**ST2.2** Number of grid-connected projects meeting funding-ready criteria and/or ready to be implemented

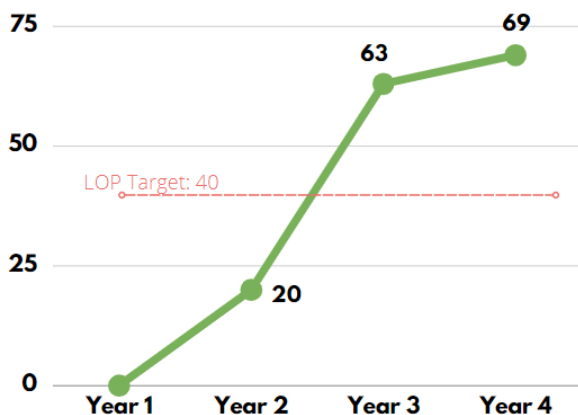


The only new project fully meeting funding-ready criteria during the past year is the 5MWp grid-connected PLTS in Namlea, for which a FS was conducted in 2021 as a potential IPP project and the project was found to be feasible. This project is included in PLN's latest RUPTL, and therefore is considered to be funding and implementation ready.

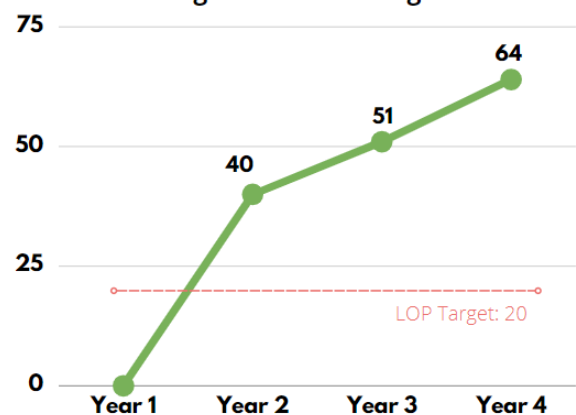
Many of the other projects progressed during the past year, including the 52 hybrid PLTS sites for which FS were conducted, are not yet counted as funding and implementation ready as they are still pending formal approval from PLN head office to be included in its business plan. There are indications that one will be implemented in 2022 under the LisDes programme, and a further 4 will be included in the 2022 diesel replacement IPP programme, however formal confirmation has not yet been received. It is hoped that some or all of these sites will progress to funding-ready status and indeed secure funding from PLN's internal budget in the coming year.

**Short-term outcome 3: Skills and knowledge of key government, education and industry partners increases.**

**ST3.1** Number of PLN and ESDM staff with increased skills and knowledge after participating in training activities through NZMATES.



**ST3.2** Number of individuals from other organisations with increased RE skills and knowledge after participating in training activities through NZMATES.



Indicators ST3.1 and 3.2 are measured by comparing pre- and post-test results of training participants. Where a participant increases their test score after attending training, they are considered to have

improved their skills/knowledge. Note that pre- and post-tests are not used at all trainings, and often participants who join a training late or leave early are missed in these figures. It is also worth noting that training participants are not double counted, so someone who has previously increased their knowledge after an NZMATES training event cannot be counted again even if their knowledge increases further at a later training.

There was a slight increase in the number of PLN and ESDM staff with increased skills and knowledge after participating in training activities through NZMATES, from 63 last year to 69 this year. The change is small as most of the PLN and Dinas ESDM staff attending NZMATES trainings had already attended training through NZMATES previously.

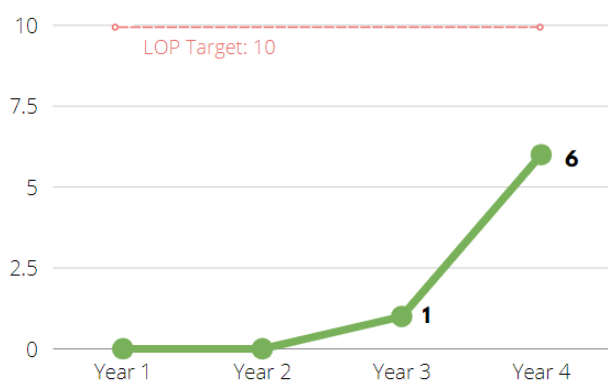
Looking beyond PLN and Dinas ESDM staff, there were 3 participants from provincial government institutions whose skills and knowledge increased after attending the LEAP software training through the RUED consultancy, and 10 vocational highschool teachers who increased their skills and knowledge through attending a workshop on introduction to renewable energy in January 2022.

## 1.4 Progress towards medium-term outcomes

In NZMATES results framework, it is anticipated that medium-term outcomes will begin to progress from year 3 onwards. As we near the end of year 4, we are happy to report good progress on most medium-term outcomes, although progress in some is more significant than others, as shown in the sections below.

### Medium-term outcome 1: Improved collaborations and enabling environment to support RE in Maluku

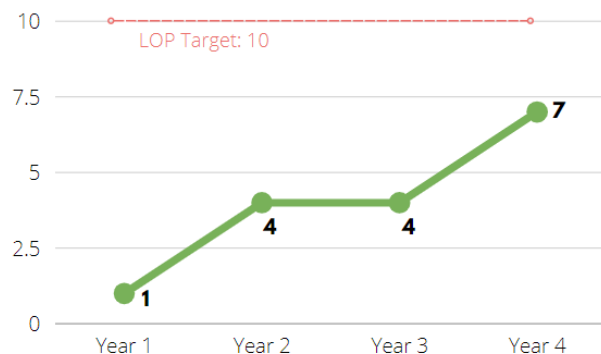
#### MT1.1 Stories of changes related to stakeholder collaboration and RE enabling environment in Maluku



This is a new indicator formally introduced in 2020 after the review of the results framework in year one following the baseline survey. NZMATES is currently contracting an independent consultant to systematically document stories of change using a rigorous qualitative methodology. The five stories of change currently counted under this indicator have been identified through NZMATES' regular stakeholder engagement, and through the annual reflection with partners' process. These stories are:

1. Specialised renewable energy teams established in PLN MMU for the preparation of PLTS pre-FS and FS.
2. Solar PV course introduced into Mechanical Engineering programme at Pattimura University after lecturer Antoni Simanjuntak was supported by NZMATES to attend Training of Trainers in solar PV.
3. More students are choosing solar PV as a research topic for their final thesis in Pattimura University's Mechanical Engineering programme, since training was provided to students through NZMATES.
4. Feasibility studies and assessments conducted by NZMATES were used by PLN MMU in their budget planning.
5. PLN MMU staff report improved capacity to conduct renewable energy planning, including completing 97 feasibility studies for hybrid PLTS projects through training and mentoring with NZMATES.
6. Collaboration with MENTARI and PLN on diesel replacement programme led to inclusion of 51 Maluku hybrid sites in early phases of the national programme

### MT1.2 Number of collaborative actions to support RE in Maluku



This indicator will also be explored more fully in the Stories of Change consultancy. However, the following collaborative actions have so far been documented:

1. Collaboration with GIZ to send UnPatti and PNA teaching staff to solar PV Training of Trainers in 2018.
2. Collaboration with ADB on refurbishment and transfer of PLTS mini-grids from EBTKE to PLN. NZMATES visited 5 sites in Maluku and provided detailed assessments and FS showing two of the sites (Watmasa and Batu Goyang) had good potential for refurbishment, and NZMATES liaised with local authorities to obtain land documentation for

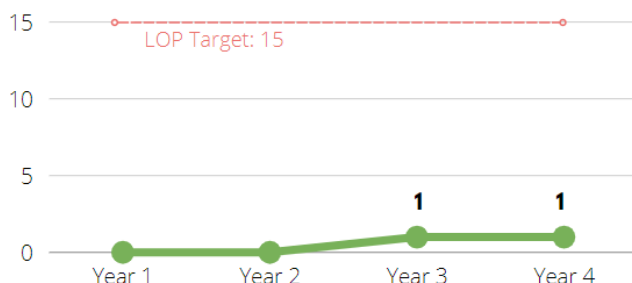
the sites.

3. MoU signed with Pattimura University
4. MoU signed with Ambon State Polytechnic
5. MoU signed with SMK 4
6. Collaboration with MENTARI to share data and align modelling assumptions on hybrid locations for PLN's diesel replacement programme
7. Collaboration with RESD to send PNA and UnPatti teaching staff to several solar PV Training of Trainers courses in 2021-2022

New collaboration opportunities are constantly emerging, for example, the new MFAT-funded RE-ACT programme has several areas of work that are complementary to NZMATES activities. These include support for RUED development and follow-up, policy advocacy and knowledge sharing, and scoping for resource potential or RE projects in Maluku and North Maluku. Early discussions between NZMATES and RE-ACT have been held regarding collaboration.

## Medium-term outcome 2: Renewable energy projects secure funding

### MT2.1 Number of off-grid RE generation projects from the NZMATES pipeline that have secured implementation funding.



Progress in securing implementation funding for RE projects (off-grid and grid-connected alike) has seen significant delays, due largely to the impacts of the covid pandemic. The pandemic has caused budget cuts and reallocations, and also made field travel to gather data impossible for almost two years.

To date only one off-grid site is recorded as having secured implementation funding, and that is the PLTS Pulau Tiga refurbishment, funded directly by MFAT through NZMATES' Discretionary Budget.

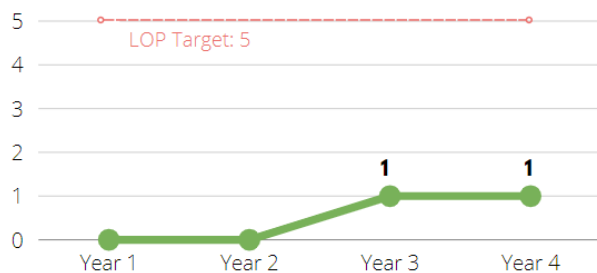
However, significant progress is expected on this front in the coming year, with several funding possibilities in process that are likely to come to fruition:

- PLN hybridisation sites to be implemented under the Village Electrification (Listrik Desa, LisDes) programme. PLN has submitted applications for two sites to be funded for implementation this year (one in Maluku and one in North Maluku), with another 51 sites in Maluku (and 44 in North Maluku) in process for funding in future years.



- 20 sites in Maluku are included in the first round of Diesel Replacement implementation, under an IPP model, due to go to procurement in late 2022. These sites shall be considered to have secured funding once PPAs are signed between PLN and the relevant IPPs.
- DAK funding for PLTS mini-grid to support fisheries industry. Four projects have been submitted for funding under this programme.

**MT2.2 Number of grid-connected RE generation projects from the NZMATES pipeline that have secured implementation funding.**



As with MT2.1 above, progress on MT2.2 has been affected by the pandemic. The only grid-connected RE generation project to have secured implementation funding so far is the Pūngao Pattimura Mini-Grid Training Lab 5kWp PLTS which was also funded directly by MFAT through the NZMATES Discretionary Budget.

The projects most likely to secure funding here are solar rooftop projects like the Governor’s Office, or one of the larger grid-connected IPP solar PV projects like the 5MWp project in Namlea.

**Medium-term outcome 3: Renewable energy projects implemented and operational**

**MT3.1 Number of off-grid RE generation systems from the NZMATES pipeline that are operating sustainably.**

**LOP Target: 10**

In progress:

Refurbishment PLTS P Tiga

**MT3.2 Number of grid-connected RE generation systems from the NZMATES pipeline that are operating sustainably.**

**LOP Target: 3**

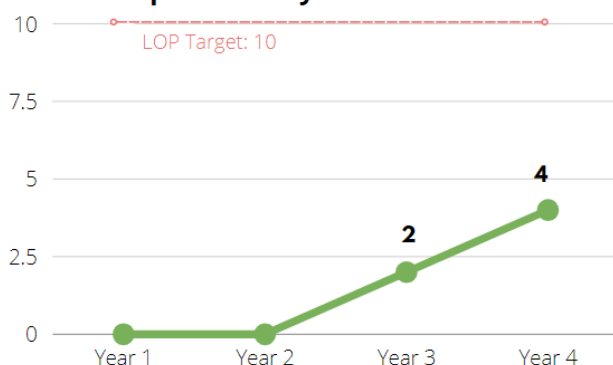
In progress:

Pūngao Pattimura Mini-grid Lab

As with MTO 2 above, progress has been slow in getting projects through to implementation and operation stage. No projects have currently been counted under these indicators so far. It is expected that the Pūngao-Pattimura Mini-Grid Training lap 5kWp installation will be the first to meet this criteria, once the final training in O&M and H&S is provided for the operators, and an operational plan is agreed with Pattimura University to ensure the sustainability of the site.

## Medium-term outcome 4: Strengthened RE capability of key government, education and industry partners

### MT4.1 Number of actions taken by partners to respond to/follow up on training and mentoring provided by NZMATES



This indicator will also be further explored during the Stories of Change special study in 2022. However, through partner reflection meetings and other regular engagement, NZMATES has so far identified four actions taken by partners to respond to or follow up on training and mentoring provided by NZMATES. These are:

1. Lecturer Antoni Simanjuntak established solar course after attending GIZ ToT (facilitated and supported by NZMATES)
2. PLN specialist teams defined as a direct result of NZMATES online training
3. PLN agreed to pay for 5-years of subscription to the online O&M platform to be developed in collaboration with NZMATES.
4. PLN MMU submitted FS developed through training and mentoring with NZMATES to PLN Pusat for funding and implementation.

### MT4.2 Number of institutions in Maluku with improved capability to deliver RE technical training programmes



The two institutions in Maluku with improved capability to deliver RE technical training programmes are:

1. Pattimura University  
 NZMATES has collaborated closely with Pattimura University’s Engineering Faculty since the start of the programme in 2018. Their capability to deliver RE technical training programmes has been enhanced through training delivered to teaching staff, including lecturer Antoni Simanjuntak, who attended a solar PV Training of Trainers in 2018, and laboratory technician Isak Apono, who has received training in solar PV both directly from NZMATES and through the Swiss RESD programme. Finally, the provision of high quality training equipment through the installation of the Pūngao Pattimura Mini-Grid Training Lab has been another enhancement to the University’s ability to deliver technical training.

#### 2. Ambon State Polytechnic

Collaboration with Ambon State Polytechnic started later, but has produced some great improvements, and in the past year various members of PNA’s teaching staff were supported to attend Training of Trainers programmes in solar PV through the Swiss RESD programme. Through this collaboration their staff now have Competency Certificates showing their ability to teach renewables-related content to students, and Lecturer Lory Parera has been asked by the Manpower Ministry to contribute to the development of training modules on solar PV to be delivered through Vocational Training Centres.

## 2 REFLECTION MEETING WITH PARTNERS

NZMATES continues to conduct an annual Reflection with Partners process to gather partners' feedback and evaluation. This year the process started on 23 February 2022 by sending out the reflection questionnaire to key persons from partner institutions and collating responses. The second phase, where FGDs are held with each institution is still on-going at the time of writing this report, due to partners' busy schedules.

This year, NZMATES invited 28 participants to fill in the questionnaire, and 12 responded.

Institutions		Target Participants	Questionnaire respondents	FGD participants
<b>PT PLN Persero</b>	PLN MMU	5	2	In progress
	PLN Regional	2	-	
	PLN EBT	1	-	
	PLN RKO	1	-	
<b>Dinas ESDM Propinsi Maluku</b>		5	2	5
<b>Badan Perencanaan Pembangunan Daerah (Bappeda)</b>		5	1	In progress
<b>Universitas Pattimura</b>		3	3	1
<b>Politeknik Negeri Ambon</b>		4	3	3
<b>EBTKE ESDM</b>		2	1	In progress
<b>TOTAL</b>		<b>28</b>	<b>12</b>	

Figure 11 presents a summary of questionnaire evaluations from NZMATES key partners PLN, Dinas ESDM, Bappeda, and EBTKE. All respondents agreed that NZMATES has made a very big contribution in helping implementation of renewable energy in Maluku by providing technical assistance and training activities. For other activities like funding search, guideline documents development, and regular mentoring, respondents agreed the contribution has been either large or very large.

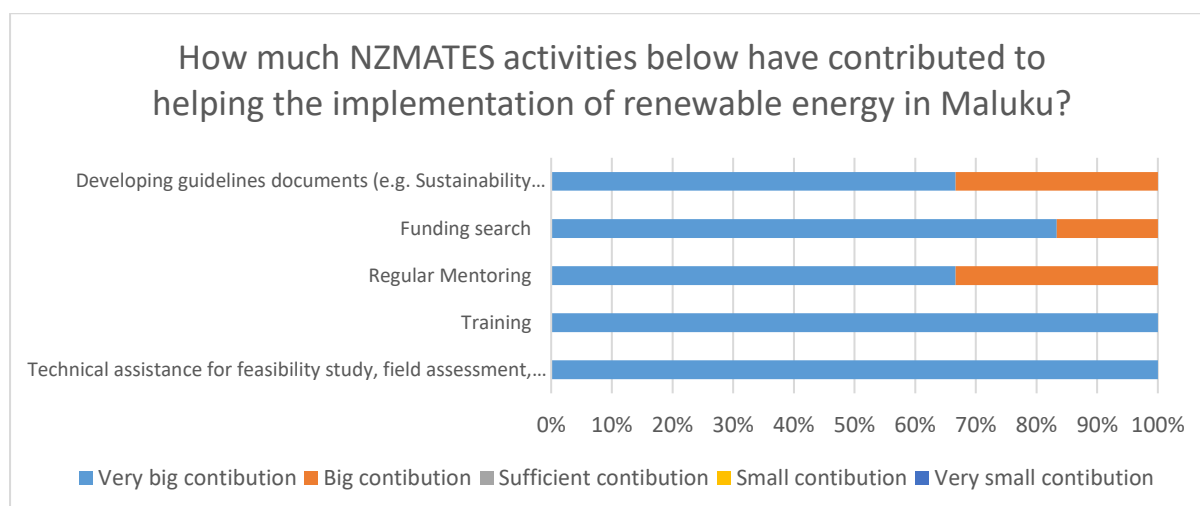


Figure 11. Questionnaire responses by PT PLN Persero, Dinas ESDM, Bappeda, and EBTKE

The participants also evaluated to what extent NZMATES activities contribute to improved capacity in their institutions. Most participants voted that technical assistance, training, and regular mentoring have made a very big contribution. For guideline document development, the vote was split between a large and very large contribution.

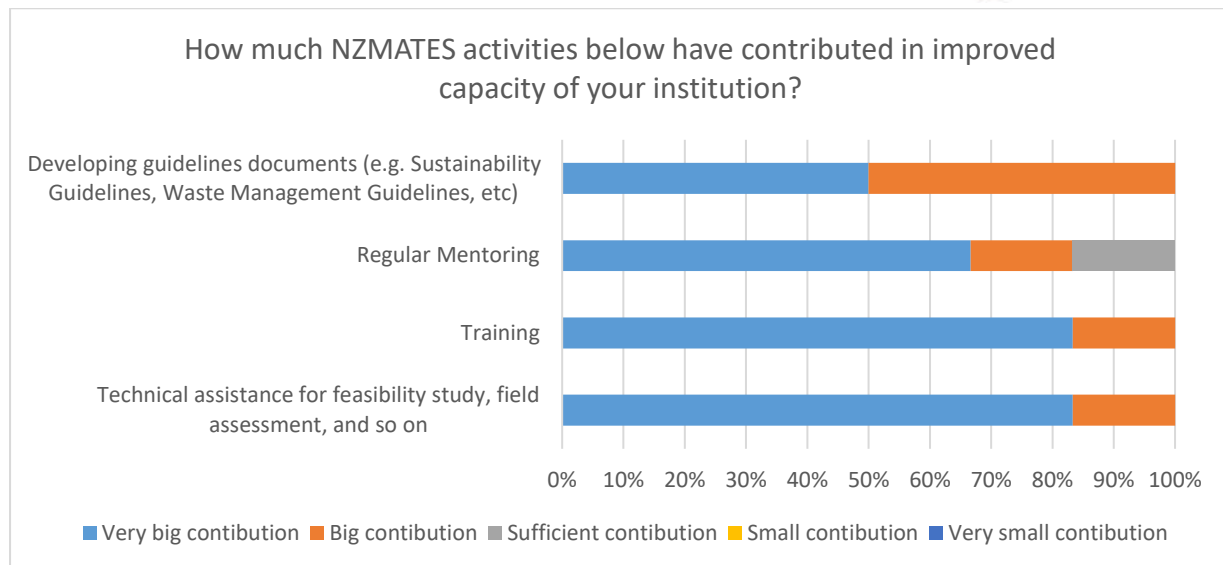


Figure 12. Questionnaire responses by PT PLN Persero, Dinas ESDM, Bappeda, and EBTKE

Most participants from education institutions agreed that training activities, support for lecturers to attend renewable energy training, and lecturer participation in NZMATES activities made a very large contribution to improving their institution’s capacity. However, evaluations of guest lectures are less conclusive as shown in the graphic below.

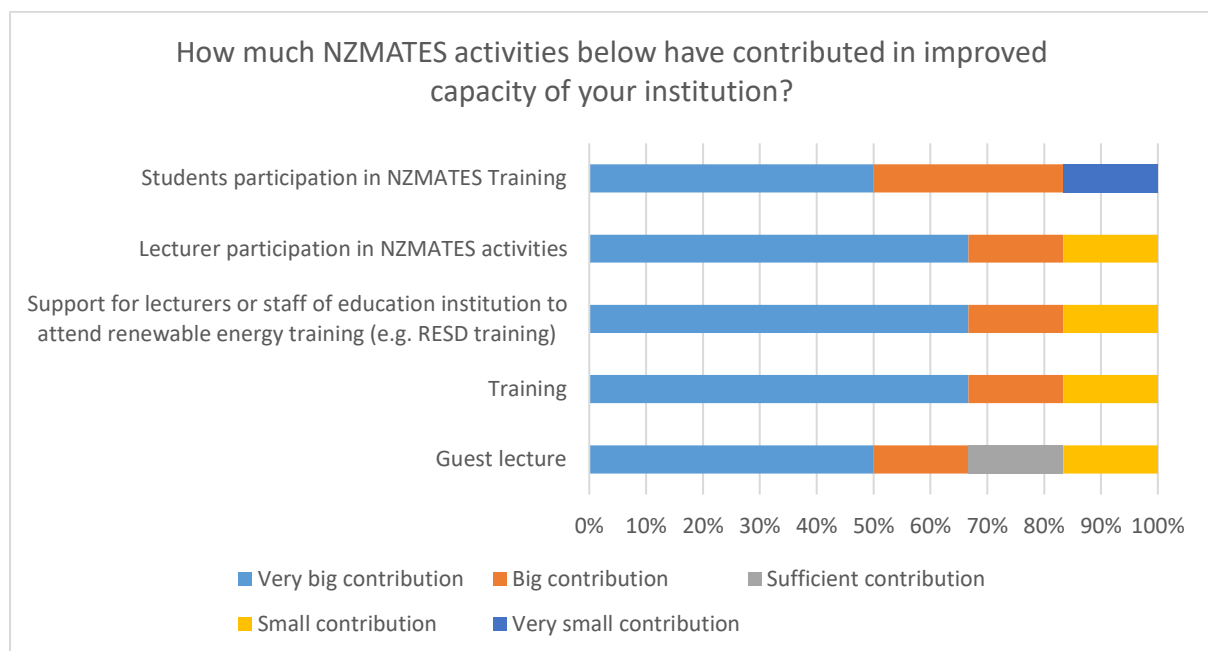


Figure 13. NZMATES Activities Contribution in helping improving institution capacity in UNPATTI and PNA

Furthermore, all partners who responded to the questionnaire agreed that coordination with NZMATES has been effective, and when asked whether coordination with NZMATES consumes too much of their time, all partners answered “no”.

NZMATES has held follow-up FGDs with UNPATTI, PNA, Dinas ESDM and PLN, but is still in the process of conducting FGD with EBTKE and Bappeda.



### 3 CROSS-CUTTING ISSUES

#### 3.1 Human rights

NZMATES continued to focus on promoting human rights by grounding all activities in a strong understanding of social, cultural and economic context, including any underlying structures of power or vulnerability, to avoid contributing to human rights violations. Although field activities were limited due to the Covid pandemic, assessments conducted in early 2022 included gathering data on social, environmental and economic factors that could affect the ability of certain groups to enjoy their human rights, such as land ownership and identifying any vulnerable groups.

NZMATES also continued to implement its Community Accountability and Reporting Mechanism (CARM) as part of Mercy Corps Global Safeguarding Policy. Within CARM, anyone can submit feedback, complaints, or report suspicious behaviour of any team member, partner or consultant. Within CARM, each submission will be responded to depending on its level of urgency, and an escalation process is in place for feedback relating to serious allegations of wrongdoing to ensure they are dealt with appropriately. Informant data is confidential and will be shared only to team members who are responsible for responding to the report. So far, all NZMATES feedbacks are collected through non-CARM channels, such as training feedback form, online meeting (verbally), and Reflection Meeting with Partners. However, it is expected that the CARM mechanism could play a more important role once community-level implementation activities start.

#### 3.2 Gender

NZMATES has continued to strive to increase the number of women participants across training activities. So far, a total of 46 women have participated in NZMATES trainings. This is 15.28% of the total number of training participants, a slight increase on the previous year at 14.05%. However, it still behind NZMATES’ target for 20% of training participants to be women.

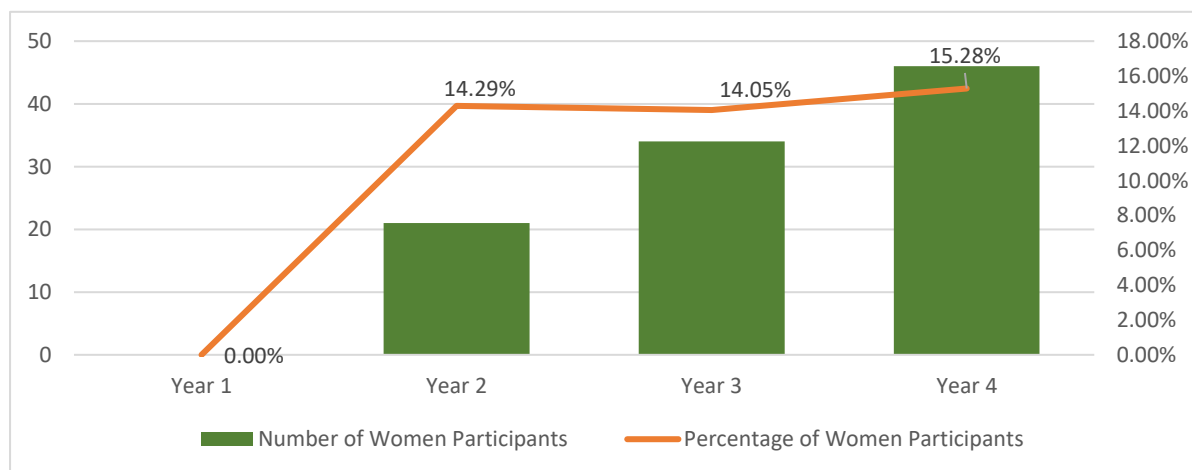


Figure 14: Number of Women Participants and the Percentage (Relative to Total Direct Participants) in NZMATES Trainings

Most of NZMATES’ women participants are affiliated with Politeknik Negeri Ambon. Women participants from PLN and Dinas ESDM represent only 7% and 6% respectively of the total number of women. This is likely due to the very low percentage of women staff at these agencies in roles related to NZMATES activities. The rest are affiliated with SMK N 4 Ambon, EBTKE, and other government agencies in Maluku, such as Bappeda and Regional Agency for Industry and Trade (Dinas Perindustrian dan Perdagangan).

## Women in Energy Initiative

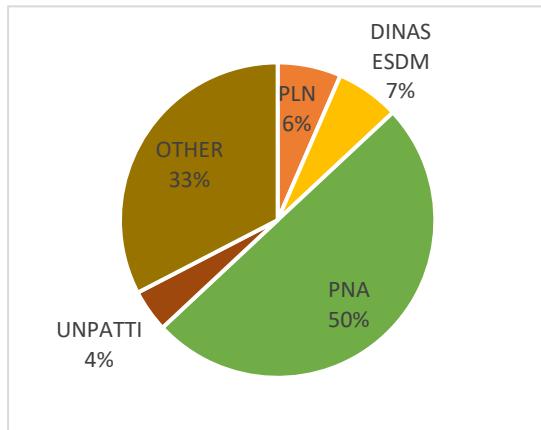


Figure 15. Affiliation of women participants

As a response to the low participation of women in NZMATES activities, NZMATES conducted its first Women in Energy Initiative. The initiative aimed to investigate challenges women face working in energy sector and identify possible strategies to increase women’s participation in the energy sector in Maluku.

The initiative was divided into three parts: data collection using a questionnaire, focus group discussions (FGD), and a public webinar. For the data collection and FGD stages, NZMATES targeted women professionals and students from partner institutions. The three most commonly reported challenges facing women working in the energy sector are the fact that

some jobs are not available for women, a lack of opportunities and communications challenges. While for female students, the most common challenges are a lack of opportunities, feeling isolated, and some duties not being a good fit for women. Details of the results are in Figure 16 and Figure 17.

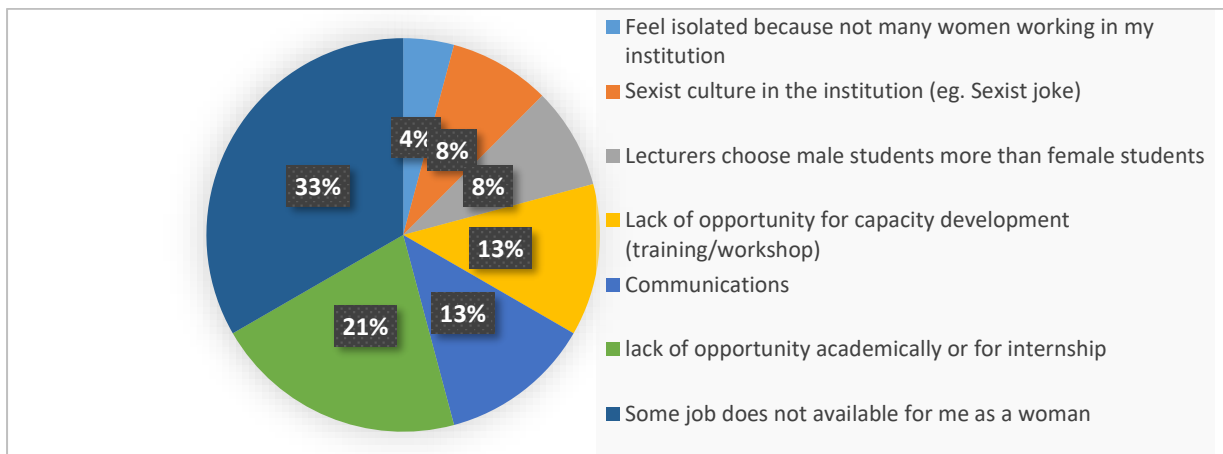


Figure 16: Challenges faced by Women working in Maluku’s energy sector

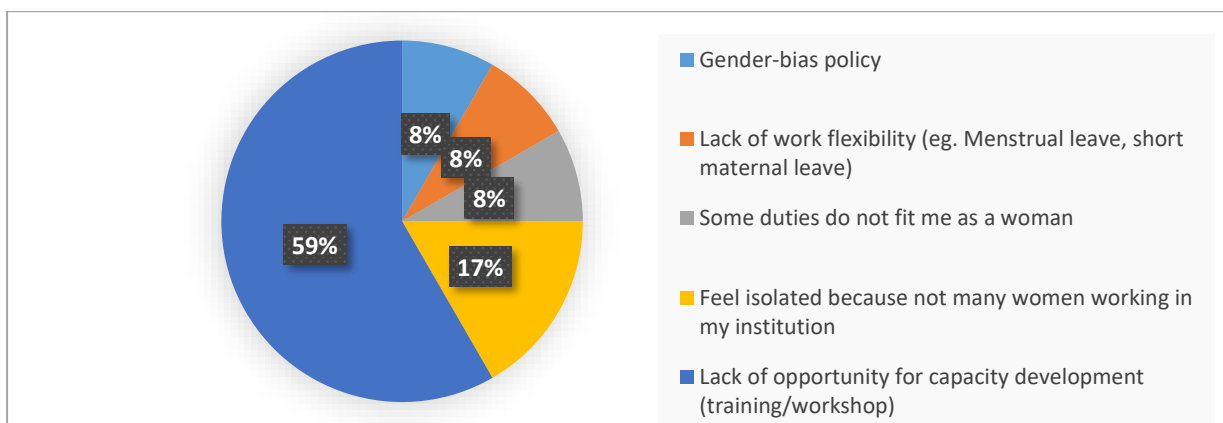


Figure 17: Challenges faced by female students in energy-related fields

Finally, the initiative closed with a webinar inviting women professionals in the energy sector. NZMATES presented an analysis of the results from questionnaires and FGD sessions. Dr Marlistya Citraningrum, Program Manager for Sustainable Energy Access at the Institute for Essential Service Reform (IESR), explained why she was motivated to work in the energy sector, challenges that she faced, and how she has dealt with these. Betti Rattekanan, who works for Bappeda Maluku, talked about renewable energy

in Maluku and government programmes to promote renewable energy and gender equality. Last but not least, NZMATES' technical specialist, Maryam Karimah presented on her experience working in the energy sector.

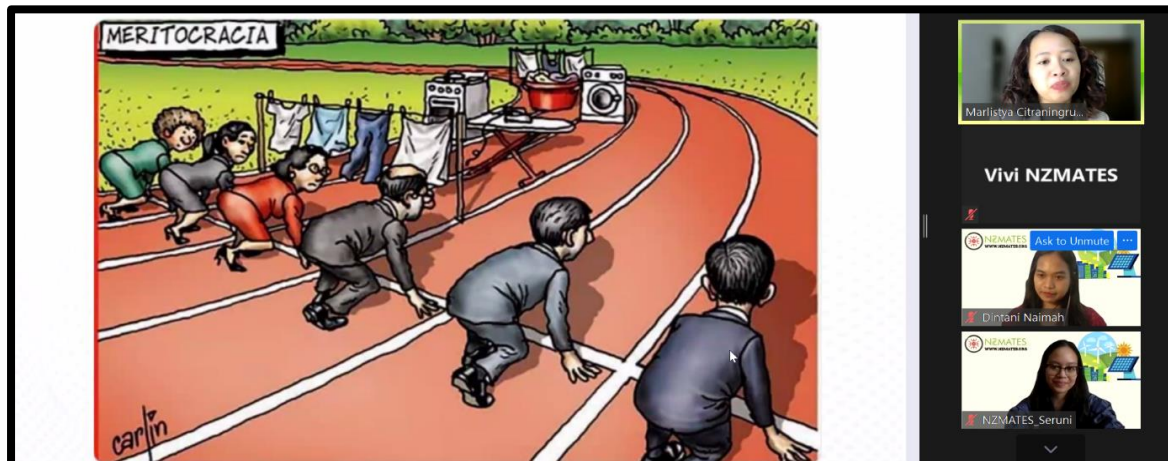


Figure 18: Women in Energy Webinar

### Follow-up activities

As a next step in understanding the factors influencing women's participation in Maluku's energy sector, NZMATES is planning a Gender Study to investigate the roles and participation of women at the grass-root level in the energy sector. The study will aim to identify current gaps and challenges, as well as social and cultural aspects (including policies) that might support or hinder women's participation. The study will produce recommendations on how gender mainstreaming can be done at various levels to create inclusive energy sector development in Maluku.

Internally, one area where NZMATES has noted a gender imbalance is in the low number of women applying for technical positions on the NZMATES team. In order to respond to this challenge, as well as to build local RE technical expertise in Maluku, NZMATES hired two female Renewable Energy Junior Engineers (REJE) from Maluku on 4-month internship programmes. In addition to receiving training and mentoring from the NZMATES and Infratec technical teams, both REJEs have contributed to developing DAK proposals for Dinas ESDM, monitoring the Pūngao Pattimura Mini-grid training lab solar installation, delivering training activities, and representing NZMATES in promoting renewable energy in Maluku through an Instagram Live event hosted by ENTER Nusantara. Both REJE have completed their 4-month internships and have accepted permanent roles with NZMATES.

### 3.3 Environment and Resilience

Mitigating climate change and environmental impact has always been at the heart of the NZMATES Programme, which aims to support the Government of Indonesia's targets:

- Increasing renewable energy to 23% of the total energy supply by 2025 and 31% by 2050 (NEP, 2014);
- Reducing unconditionally 26% of its greenhouse gases against the business-as-usual scenario by the year 2020 (UNFCCC, 2015) and conditional reduction of up to 41% reduction by 2030 (COP21, 2015).

This year, NZMATES finished drafting Solar Energy Waste Management Guidelines, including a round of consultation with Provincial authorities. Currently the results of consultation are being incorporated into the Guidelines and preparations are underway for dissemination and discussion with District-level authorities, especially for districts that are home to broken solar mini-grids in need of de-commissioning. The document and knowledge transfer are part of NZMATES' efforts to minimize the environmental impact of solar energy and to deliver assistance at all phases of project implementation.

[www.nzmates.org](http://www.nzmates.org)

NZMATES continues to try to improve the resilience of communities at all levels by reducing dependency on fossil fuel generation. This year, NZMATES is exploring a new initiative of solar rooftop for remote island health facilities. This initiative is all the more urgent in the context of the global Covid pandemic, which has put pressure on health facilities at all levels. Communities in remote and rural areas are hit harder due to limited healthcare access and facilities. By installing solar generation systems in health facilities in remote areas, it is hoped to increase local community resilience by reducing the reliance on expensive diesel generation.

Environmental initiatives outside of NZMATES renewable energy scope have included a “Plastics Ban” for all NZMATES events, office, and other activities. Over the past year this was less intensive as few face-to-face activities took place.



*Figure 19: NZMATES RETS Usep Nuraen interviews a local Health Agency official in East Seram to gather data on a potential solar rooftop project for a remote health centre facility*



## 4 KEY LESSONS LEARNED

As an adaptive programme, learning and reflection play an important role in NZMATES' planning and management approach. The sub-section below provides a brief overview of one of the key areas of learnings over the past year – the importance of coordination and collaboration with various stakeholders in the RE sector. Following that, a summary of other lessons learned across the other aspects of the programme is provided.

### 4.1 The importance of collaboration

NZMATES has always recognised that collaboration is essential to the success of our programme, and to the success of Indonesia's transition to renewable energy. In a large and crowded sector with many different actors and international donor-funded programmes, NZMATES takes a proactive and constructive approach to working with others – whether government institutions, PLN or other NGOs and donor programmes. This not only helps NZMATES to be seen as the go-to entity for RE in Maluku – other actors have an incentive to reach out to NZMATES if they know we will be supportive and collaborative – but also allows us to leverage the resources of other like-minded organisations to achieve greater impact. Collaborations are captured to a certain extent in our indicators (see Figure 20), however the stories behind these collaborations provide valuable lessons.

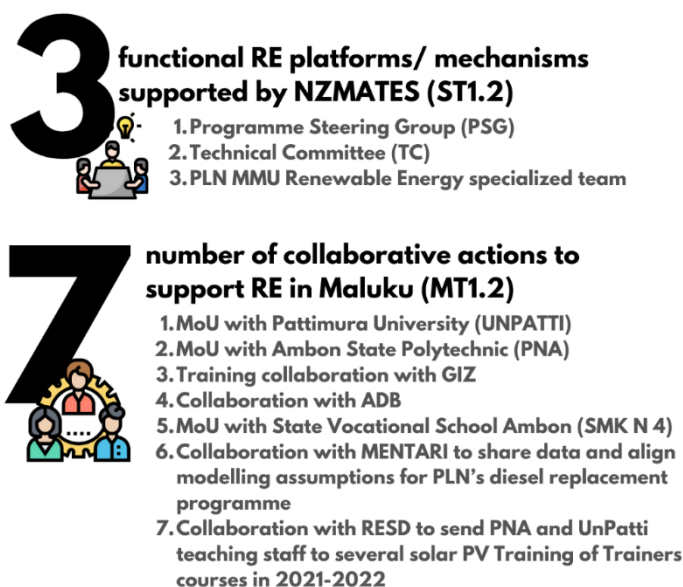


Figure 20: NZMATES indicators for collaboration

### Technical assistance

During the pandemic in 2020, NZMATES began discussions with the UK-funded MENTARI Programme, and specifically their support for PLN's national diesel replacement programme, under which hundreds of diesel-powered grids throughout Indonesia would be hybridised with solar PV or other RE generation. NZMATES worked together with MENTARI, providing data on dozens of potential hybridisation sites in Maluku (through pre-FS conducted at PLN MMU's request in 2020), and ensuring that modelling assumptions and methodologies were aligned between the Maluku sites and sites elsewhere in Indonesia. This collaboration has resulted in 51 additional sites in Maluku and North Maluku being included in the early phase of the national diesel conversion program. 20 of these sites in Maluku Province are slated to start procurement in 2022.

The key factors influencing the success of collaborations like these are taking a proactive approach to monitoring activity in the Indonesian RE sector and reaching out to other actors with similar goals. NZMATES takes a constructive collaboration approach, freely sharing data, knowledge products and lessons learned with others working in the sector. Where confidentiality is an issue, such as with commercially sensitive PLN data, NZMATES ensures PLN is involved in the collaboration and provides approval for the sharing of information. Given that NZMATES has a narrow geographical focus, collaborating with programmes that have a national scope provides opportunities for national-level impact that NZMATES may not be able to achieve alone.

## Capacity building

NZMATES has also enjoyed several fruitful capacity building collaborations, in particular with GIZ and RESD. In both cases, NZMATES has been able to support staff from UnPatti and PNA to attend RE ToT activities that would not otherwise have been open to participants in Maluku. The impacts of these collaborations have been immediately evident, for example when Pak Antoni of UnPatti immediately offered a course to his students on solar PV after attending the GIZ ToT. After attending the RESD ToT on solar PV, PNA lecturer Lory Parera has been invited to support curriculum development and training activities to support RE training programmes through BLK nationwide. There is also discussion around RESD using the Pūngao Pattimura Mini-grid Training Lab for solar energy trainings to be conducted with Ambon's BLK.

These impacts show how, through close collaboration, a small amount of time and funding from NZMATES can leverage resources from other programmes to drive positive outcomes for Maluku and NZMATES programme goals.

## Stakeholder coordination

With numerous actors in Indonesia's energy landscape, creating sound governance for the energy transition can be a complex process. A lack of coordination among stakeholders remains a challenge in the RE sector, and can lead to ineffective project implementation. NZMATES has encountered many examples of this, such as renewable energy projects implemented by one Ministry without the knowledge of relevant Provincial authorities such as Dinas ESDM and Bappeda.

At the national level, there have been attempts to improve coordination, including the Village Electricity Solution (Solusi Listrik Desa, SOLID) Forum set up by EBTKE and GIZ in 2019 to integrate off-grid RE development across Indonesia, or the RE Donor Coordination Forum facilitated by EBTKE and MENTARI in 2020. However, both of these initiatives are currently inactive.

NZMATES aims to establish a Maluku Energy Stakeholder Forum, as a forum for discussion and coordination between all RE stakeholders in the province. However, NZMATES is well aware of the challenges in ensuring that a forum of this nature can be sustained beyond the end of the NZMATES programme, so discussions are ongoing with key partners such as Dinas ESDM and Bappeda on how best to address these challenges. NZMATES has also discussed lessons learned from the SOLID forum with EBTKE to help inform a more sustainable model.



*Figure 21: RESD programme team visits the solar lab at Pattimura University to check its suitability as a training venue.*

## 5 NEXT STEPS

For full details on next steps please see the ninth Forward Operating Plan (FOP). A high-level summary of planned next steps is provided below, for semester 9 and 8 of the NZMATES programme, from April 1st 2021 – March 30th 2022.

**Table 3: Key tasks planned for FOP 9**

Key Task	Timeline
Maintain office operations and stakeholder relationships	Ongoing
Continue coordination with other donor programmes, including ADB, World Bank, French Development Agency, Foreign Commonwealth Office from the United Kingdom, Swiss Development Agency	Ongoing
Continue to identify and appraise new grid-connected and off-grid projects for the project pipeline	Ongoing
Continue training and mentoring activities for Dinas ESDM and PLN MMU	Ongoing
Hold sixth PSG meeting	April 2022
Finalise support for Dinas ESDM with RUED (General Provincial Energy Plan)	May 2022
UnPatti solar lab implementation and kick-off	May 2022
Pilot trainings at UnPatti solar lab in H&S for PLTS and PLTS operation	May 2022
Complete special study on partners' story of change	June 2022
Complete tender and contracting process for Pulau Tiga PLTS	June 2022
Support implementation of PLN LisDes hybridisation sites	June 2022
Support SMK 4 with implementation of new RE study programme	June 2022
Hold eighth TC meeting	Aug 2022
Complete special study on barriers and opportunities for women's participation in the Maluku energy sector	Sept 2022
Progress with O&M platform deployment and training for PLN	Sept 2022
Contract and implement ToT for UnPatti solar lab trainers	Sept 2022
Continue to support Ambon Polytechnic collaboration with Swiss RESD programme in RE curriculum development	Sept 2022
Conduct solar rooftop campaign for commercial sector in Ambon	March 2023
Support EBTKE 2022 rooftop solar programme implementation	March 2023
Support preparation of full GCF proposal (if required)	March 2023
Support implementation of PLN diesel replacement Maluku sites	March 2023

For the full plan for semester 9 of the NZMATES programme, and an outline of estimated semester 10 activities, please refer to the seventh Forward Operating Plan (FOP).

## ANNEX 1: NZMATES INDICATORS

Level	Result	No.	Performance Indicator
Long term outcome	Improved access to electricity in target areas	LT1.1	Electrification rate in Maluku Province.
		LT1.2	Number of communities with new or improved access to electricity from RE sources through NZMATES.
Long term outcome	Increased use of renewable energy in target areas	LT2.1	Percentage (%) of electricity produced in Maluku from renewable energy sources.
Medium term outcome	Improved collaborations and enabling environment to support RE in Maluku	MT1.1	Stories of changes related to stakeholder collaboration and RE enabling environment in Maluku
		MT1.2	Number of collaborative actions to support RE in Maluku
Medium term outcome	Renewable energy projects secure funding	MT2.1	Number of off-grid RE generation projects from the NZMATES pipeline that have secured implementation funding.
		MT2.2	Number of grid-connected RE generation projects from the NZMATES pipeline that have secured implementation funding.
Medium term outcome	Renewable energy projects implemented and operational	MT3.1	Number of off-grid RE generation projects from the NZMATES pipeline that are operating sustainably.
		MT3.2	Number of grid-connected RE generation projects from the NZMATES pipeline that are operating sustainably.
Medium term outcome	Strengthened RE capability of key government, education and industry partners	MT4.1	Number of actions taken by partners to respond to/follow up on training and mentoring provided by NZMATES
		MT4.2	Number of institutions in Maluku with improved capability to deliver RE technical training programmes
Short term outcome	Platforms for RE initiatives established by or between local government actors, education institutions and industry players in partnership with NZ and other donors	ST1.1	Number of project assistance requests from private sector, government or community
		ST1.2	Number of functional RE platforms/mechanisms supported by NZMATES
Short term outcome	Renewable energy projects are funding and implementation ready	ST2.1	Number of off-grid projects meeting funding- and implementation-ready criteria.
		ST2.2	Number of grid-connected projects meeting funding- and implementation-ready criteria
Short term outcome	Skills and knowledge of key government, education and industry partners increases	ST3.1	Number of PLN and ESDM staff with increased skills and knowledge after participating in training activities through NZMATES.
		ST3.2	Number of individuals from other organisations (companies, communities, educational institutions) with increased RE skills and knowledge after participating in training activities through NZMATES.
Output	Programme platform operating	O1.1	Qualified PMO team in place.
		O1.2	PMO has sound, relevant procedures and policies in place, approved by Programme Manager and updated annually.
		O1.3	Results framework reviewed annually and endorsed by PSG.
		O1.4	Number of PSG meetings that are well-attended and produce clear outcomes.



		O1.5	Number of TC meetings that are well-attended and produce clear outcomes.
Output	Programme framework mapped and in use	O2.1	Institutional framework mapping updated annually and approved by PM.
		O2.2	Technical framework analysis updated annually and approved by PM.
		O2.3	Financing, funding, and grants catalogue updated annually and approved by PM.
Output	Renewable energy projects progress smoothly through the project pipeline	O3.1	Number of RE projects in the NZMATES pipeline that have made progress towards funding.
		O3.2	Number of RE project documents (assessments, reports, studies, surveys, or proposals) made to support the progress of NRE projects through the NZMATES pipeline with partner approval
		O3.3	Number of RE projects or initiatives appraised for potential inclusion in the pipeline
Output	Training and mentoring provided according to RE skills gaps identified	O4.1	Number of people who receive training through NZMATES
		O4.2	Number of training activities conducted aligned with identified skill gaps.
		O4.3	Number of training arrangements established between Indonesian and NZ universities or other educational institutions
		O4.4	Percentage of people reporting satisfaction with relevance of training.

## ANNEX 2: SUMMARY OF PROGRESS AGAINST INDICATORS

The table below shows progress so far against output and short-term outcome level indicators. It also includes progress so far against medium-term indicators.

No.	Indicator	Year 1	Year 2	Year 3	FOP 7	FOP 8	LOP target	Comments on FOP 6 & 7 progress
<b>O1.1</b>	Qualified PMO team in place	Yes	Yes	Yes	Yes	Yes	Yes	
<b>O1.2</b>	PMO has sound, relevant procedures and policies in place, approved by Programme Manager and updated annually.	Yes	Yes	Yes	Yes	Yes	Yes	
<b>O1.3</b>	Results framework reviewed annually and endorsed by PSG.	No	Yes	Yes	Yes	Yes	Yes	
<b>O1.4</b>	Number of PSG meetings that are well-attended and produce clear outcomes.	0	2	2	4	5	9	4 <sup>th</sup> PSG held on May-21 5 <sup>th</sup> PSG held on Nov-21
<b>O1.5</b>	Number of TC meetings that are well-attended and produce clear outcomes.	1	3	4	5	6	9	5 <sup>th</sup> TC Meeting held on April-21 6 <sup>th</sup> TC Meeting held in Oct-21
<b>O2.1</b>	Institutional framework mapping updated annually and approved by PM.	Partial	Yes	Yes	Yes	Yes	Yes	
<b>O2.2</b>	Technical framework analysis updated annually and approved by PM.	Partial	Yes	Yes	Yes	Yes	Yes	
<b>O2.3</b>	Financing, funding and grants catalogue updated annually and approved by PM.	Partial	Yes	Yes	Yes	Yes	Yes	
<b>O3.1</b>	Number of RE projects in the NZMATES pipeline that have made progress towards funding.	0	14	17	66	67	15	New projects in NZMATES pipeline: 18. IPP Namlea 19. IPP Bula 20-66. PLN's 52 Hybridization locations (5 already in the pipeline as refurbishment project) 67. PLTS Rooftop 2021
<b>O3.2</b>	Number of assessments, studies or surveys conducted to support RE projects and received by partners.	0	12	25	31	33	NA	New reports submitted: 26. PLTS Waste Management and Decommissioning Guidelines 27. KKF IPP Bula 28. KKF IPP Namlea 29. Pulau Tiga tender documents 30. GCF Concept Note for Refurbishment 31. GCF Concept Note for Hybridization 32. PLN's Study for Hybridization Locations 33. Sustainability Guidelines
<b>O3.3</b>	Number of RE projects or initiatives appraised for potential inclusion in the pipeline	42		54	107	108	NA	New projects appraised: 55. Dinas ESDM' DAK Locations

No.	Indicator	Year 1	Year 2	Year 3	FOP 7	FOP 8	LOP target	Comments on FOP 6 & 7 progress
								56-107. PLN's 52 Hybridization locations 108. Solar Rooftop 2021
<b>O4.1</b>	Number of people who receive training and/or mentoring through NZMATES	2	147	247	256	<b>301</b>	350	
<b>O4.2</b>	Number of training activities conducted aligned with identified skill gaps.	0	5	9	11	<b>13</b>	10	New trainings: 10. LEAP for Stakeholders 2 11. PLN Online Training for Hybrid Project Feasibility 12. Hybrid Training for PNA Students 13. Training for SMK N 4 Teachers
<b>O4.3</b>	Number of training arrangements established between Indonesian and NZ universities or other educational institutions	0	0	0	0	<b>0</b>	1	
<b>O4.4</b>	Percentage (%) of people reporting satisfaction with the relevance of training.	-	90.2%	86.92%	93.67%	<b>85.85%</b>	90%	Satisfaction level for each training in Year 4: - LEAP for Stakeholder 2 = 97.62% - PLN Online Training for Hybrid Project Feasibility = 89.7% - Hybrid Training for PNA Students = 74.07% - Training for SMK N 4 Teachers = 97.62%
<b>ST1.1</b>	Number of project assistance requests from private sector, government or community	42	51	56	109	<b>109</b>	115	New project requests: 57. Dinas ESDM' DAK Locations 58-109. PLN's 52 Hybridization locations
<b>ST1.2</b>	Number of functional RE platforms/mechanisms supported by NZMATES	-	-	3	3	<b>3</b>	5	Functional RE platforms: - PSG Meeting - TC Meeting - PLN RE Specialized Team
<b>ST2.1</b>	Number of off-grid projects meeting funding-ready criteria and/or ready to be implemented.	0	1	9	9	<b>9</b>	15	Off-grid projects funding and/or implementation ready: 1. P Tiga 2. Tahalupu 3. Kur 4. Panjang 5. Manawoko 6. Wetar 7. Watmasa 8. Batu Goyang 9. Lirang
<b>ST3.1</b>	Number of grid-connected projects meeting funding-ready criteria and/or ready to be implemented.	0	0	3	3	<b>3</b>	5	Grid-connected projects funding and/or implementation ready: 1. Elat 2. Kisar 3. UNPATTI Solar Lab

No.	Indicator	Year 1	Year 2	Year 3	FOP 7	FOP 8	LOP target	Comments on FOP 6 & 7 progress
ST4.1	Number of PLN and ESDM staff with increased skills and knowledge after participating in training activities through NZMATES.	0	20	63	69	69	40	# Of PLN and ESDM Staff with increased skills and knowledge: +1 participants from LEAP Stakeholders 2 +5 participants from PLN Hybrid Feasibility Training
ST4.2	Number of individuals from other organisations (companies, communities, educational institutions) with increased RE skills and knowledge after participating in training activities through NZMATES.	0	40	51	54	64	20	# Of other individuals with increased skills and knowledge: +3 participants from LEAP Stakeholders 2 +10 from training for SMK N 4 Teachers
MT1.1	Stories of changes related to stakeholder collaboration and RE enabling environment in Maluku	NA	NA	1	4	6	10	New stories of change: 2. New Solar PV Course in UNPATTI 3. More students conducting research in renewable energy 4. FS from NZMATES used for PLN budget planning 5. PLN MMU staff increased capacity in developing FS 6. Collaboration between NZMATES and MENTARI added 51 sites in Maluku to diesel replacement programme
MT1.2	Number of collaborative actions to support RE in Maluku	1	4	4	5	7	10	New collaborative actions: 5. MoU with SMK N 4 6. Collaboration with MENTARI to share data and assumption for PLN's diesel replacement programme 7. Collaboration with RESD to include UNPATTI and PNA staffs in several solar PV training of trainers
MT2.1	Number of off-grid RE generation projects from the NZMATES pipeline that have secured implementation funding.	0	0	1	1	1	15	
MT2.2	Number of grid-connected RE generation projects from the NZMATES pipeline that have secured implementation funding.	0	0	1	1	1	5	
MT3.1	Number of off-grid RE generation systems from the NZMATES pipeline that are operating sustainably.	0	0	0	0	0	10	
MT3.2	Number of grid-connected RE generation systems from the NZMATES pipeline that are operating sustainably.	0	0	0	0	0	3	
MT4.1	Number of actions taken by partners to respond to/follow up on training and mentoring provided by NZMATES	NA	NA	2	3	4	10	New actions taken to respond on training and mentoring: 3. PLN agreed to pay for 5-years of subscription to the online O&M platform to be developed in collaboration with NZMATES. 4. PLN MMU submitted FS developed through training and mentoring with NZMATES to PLN Pusat for implementation.
MT4.2	Number of institutions in Maluku with improved capability to deliver RE technical training programmes	NA	NA	1	1	2	1	Institutions with improved capability to deliver RE technical training: 1. UNPATTI 2. PNA



## ANNEX 3: PIPELINE ACTIVITY SUMMARY

Pipeline task	Description / goal	Progress this year
RUED finalisation	Support Dinas ESDM to finalise General Regional Energy Plan (RUED) for Maluku Province.	RUED document has been finalised, incorporating updated RUPTL from PLN. RUED document and academic paper submitted to Provincial Legislature, and regulation has been enacted and awaits approval from Governor. Final public dissemination still pending.
Pulau Tiga refurbishment PLTS	Finalise tender documents and conduct procurement process for PLTS Pulau Tiga refurbishment.	Tender documents approved by Mercy Corps Global. Signing of Project Agreement between MCI and PLN in progress.  Planning for sustainability and community engagement is conducted.
Waste management protocols and SOP	Guidance for local government on disposal of broken solar assets	Draft document developed and discussed with provincial stakeholders such as Bappeda, Environmental Office and Revenue, Financial and Asset Management Agency. Feedback from these agencies incorporated into draft and preparations underway for dissemination at the District and Regency level.
GCF concept note	Concept note to be submitted to GCF for a financing framework for RE projects in remote islands to be administered by PT SMI. PLN hybridisation projects to be included as potential pipeline for financing.	NZMATES submitted two concept notes for PLN projects and PT SMI chose to act as Accredited Entity for them. Original NZMATES concept notes adapted by consultant, GGGI and PT SMI to produce new financing framework concept. Consultant currently working on final draft concept note for submission to GCF board.
Guidelines on mini-grid sustainability	Guidelines aimed at Dinas ESDM, Bappeda and other Provincial-level actors interested in implementing solar mini-grids outlining lessons learned from NZMATES assessments and recommendations for sustainability of new projects.	Guidelines developed and disseminated through workshops with Provincial partners, PLN RE Division, and the public through a workshop at IndoEBTKE ConEx. Currently guidelines are being translated into Bahasa Indonesia.
Community engagement guidelines for Maluku energy projects	Guidelines aimed at PLN, Dinas ESDM and other provincial stakeholders to inform good practices when engaging communities for energy projects.	Guidelines are currently being drafted by NZMATES.

PLN O&M Platform	Development of cloud-based O&M management platform and pilot roll-out at 20 PLN sites in Maluku.	This project was paused pending discussions with PLN on eventual asset transfer administrative processes. Re-started in early 2022, and a draft Project Agreement is under development with PLN.
IPP FS for Bula and Namlea FS for PLN MMU	Conduct FS for two potential PLTS, Bula (3 MWp) and Namlea (5 MWp) for PLN MMU.	Completed. Namlea project feasible, while Bula not feasible at this stage due to low load.
PLN IPP proposal streamlining	Providing mentoring to PLN and developing and sharing guidelines to PLN in the evaluation of IPP projects.	Guidelines developed, mentoring and training provided, and guidelines accepted by PLN.
Support for EBTKE solar rooftop programme 2020	Develop O&M guidelines and provide training in O&M and Health and Safety to the designated operators.	Guidelines completed. Pending training in H&S and O&M for operators, delayed due to covid.
Support for EBTKE solar rooftop programme 2021	Conduct due diligence on FS for one of the potential rooftop sites in Maluku and present to EBTKE and Dinas ESDM.	Due diligence conducted on Governor's Office site, results presented to Dinas ESDM and EBTKE.
DAK funds for Maluku National Fishery Barn RE project	Identify RE projects that support the Maluku National Fishery Barn initiative that can be proposed for funding through GoI DAK programme in 2022. Develop FS and proposal together with Dinas ESDM and submit for funding.	Field trip conducted, FS completed and proposal under finalisation for submission to EBTKE for funding.
Feasibility studies for PLN LisDes hybridisation sites	97 FS on potential hybridisation projects conducted by PLN MMU and UP3 with support from NZMATES through training and mentoring. FS submitted to PLN head office for budget allocation.	NZMATES mentored PLN MMU in the preparation of the FS (52 of which are in Maluku), and these were submitted to PLN head office for funding. So far one site each in Maluku and North Maluku are indicated for implementation in 2022, with the others pending budget allocation in future years.  4 of these locations are indicated for inclusion in the 2022 diesel replacement programme (see below).
PLN Dedieselisasi support	National programme to hybridise diesel grids with solar. 20 sites in Maluku for which NZMATES did pre-FS and/or FS studies have been included in phase I which is to start implementation in 2022 through IPP process.	NZMATES worked with PLN to do pre-FS studies for a large group of hybridisation sites, and full FS for some (some of the 10 original refurbishment sites are included). NZMATES worked closely with MENTARI programme to ensure assumptions and modelling approach were coordinated across the various regions. In 2022 PLN have announced 20 locations in Maluku will be included in phase I, which will start procurement through call for IPP proposals in mid-late 2022. MENTARI have

indicated that 51 additional sites were included in the first phase thanks to collaboration with NZMATES.

Training of Trainers for Solar Lab

To provide support to Pattimura University in the form of renewable energy curricula and training material development and capacity building for trainers in solar PV.

Tender on-going



Figure 22: RETS Usep Nuraen and REJE Putri Hatuina carry out checks on the UnPatti solar lab PLTS.