



# EnDev Indonesia

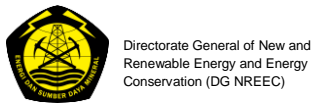
Annual Report 2015



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**Coordinated and implemented by:**



# EnDev Indonesia

Annual Report 2015

January 2016



This Annual Report provides a brief overview of achievements and learnings for the review year and further information can be obtained from GIZ.

In cooperation with:

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Cover photo caption: The villagers of Tahalupu Village in Seram Bagian Barat District, Maluku are studying the Catchment Area Protection poster

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## Foreword



The government of Indonesia is committed to increase the electrification ratio to 96% by 2019, as well as the utilisation of renewable energy in the national energy mix to become 23% by 2025. Rural electrification has been one of the priority programmes implemented by various ministries in Indonesia, of which the Directorate General for New, Renewable Energy and Energy Conservation (DJ EBTKE) under the Ministry of Energy and Mineral Resources (KESDM) plays a prominent role through its programme to provide first energy access using renewable energy technologies. The Ministry allocates substantial budget annually for rural energy infrastructure specifically electrification in remote areas, small islands, and border regions using micro-hydro and solar power.

In accomplishing its function, DJ EBTKE cooperates with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH to jointly implement the Energising Development (EnDev) Indonesia project. The project's main purpose is to support the provision of sustainable access to electricity for rural communities.

EnDev Indonesia began in 2009, with focus on micro hydro power, technical support, as well capacity development. Since 2012, the project has expanded its scope to include photovoltaic technologies, particularly related to the PV-battery system using micro-grid. Acknowledging the significance of the project towards off-grid rural electrification efforts in Indonesia, EnDev Indonesia has been extended to June 2018.

Currently, EnDev Indonesia project mainly supports DJ EBTKE's rural off-grid electrification programme, which constructs over 100 PV-battery and micro hydro power micro-grids across the country annually. The project puts sustainability measures in place, such as technical quality review, skills development for facilitators and beneficiary communities, as well as monitoring activities. The project also proactively cooperates with other institutions implementing rural electrification through various cooperation schemes, in order to synergize the initiatives among stakeholders. We do hope this GIZ support can improve the government projects on rural electrification in a sustainable way.

### **Maritje Hutapea**

Director of Various New and Renewable Energy  
Directorate General for New, Renewable Energy and Energy Conservation (DJ EBTKE)  
Ministry of Energy and Mineral Resources (KESDM)  
Republic of Indonesia

## Foreword

GIZ reinforces its support for renewable energy and energy conservation in Indonesia with the establishment of an Energy Programme in 2014. Under this programme, GIZ in cooperation with DJ EBTKE jointly implements the EnDev Indonesia project to address sustainability issues in off-grid rural electrification.

Recognising the tremendous efforts of the Indonesian government to provide new energy access for millions of people in the most remote areas, EnDev Indonesia emphasises its support on three aspects i.e. capacity development, technical assessment and monitoring, and knowledge management. These measures mainly target beneficiaries on a micro-level, such as communities and cooperatives, as well as on a meso-level, such as rural facilitators, technicians, and local government. Based on the lessons learned throughout the support, EnDev Indonesia continuously searches for the most effective formula and approach in rural electrification.



The year 2015 marks the year of assurance where the EnDev Indonesia project continued its mission to strengthen the sustainability aspect of off-grid rural electrification using renewable energy resources, with DJ EBTKE as the lead implementing partner. The project has been recognised for its vast experience and its developed knowledge materials and tools to be openly used by public.

The project also consistently maintains practical collaboration with various institutions which implement energy access programmes. Such collaboration may support DJ EBTKE's development strategy as the focal point of decentralised rural electrification.

The primary challenge ahead is to anchor all learnings throughout the years to be embedded in all rural off-grid electrification endeavour in the country. For this purpose, the project commits to strengthen the capacity of the local actors to play a prominent role in the sector.

### **Dr. Rudolf Rauch**

Director of Energy Programme Indonesia/ASEAN

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

## Abbreviation

ADB	Asian Development Bank
BCD	Business Capacity Development
CSO	Civil Society Organisation
DJEBTKE	Direktorat Jenderal Energi Baru, Terbarukan dan Konservasi Energi (Directorate General for New, Renewable Energy and Energy Conservation)
EnDev	Energising Development
FGD	Focus Group Discussion
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
Green PNPM	Green component of PNPM (pilot project for green technologies)
GSM	Global System for Mobile Communications
HERA	The GIZ's Programme on Poverty-oriented Basic Energy Services
Kemendes	Kementerian Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi (Ministry of Village, Rural Development, and Transmigration)
KESDM	Kementerian Energi dan Sumber Daya Mineral (Ministry of Energy and Mineral Resources)
KKP	Kementerian Kelautan dan Perikanan (Ministry of Marine Affairs and Fisheries)
KPI	Key Performance Indicator
KUKM	Kementerian Koperasi dan Usaha Kecil dan Menengah (Ministry of Cooperatives and Small and Medium Enterprises)
MHP	Mini/micro Hydro Power
MSP	Micro-grid Service Package
NAM CSSTC	Non-Aligned Movement Centre for South-South Technical Cooperation
NGO	Non-Government Organisation
OS	Operating system
PNPM	Program Nasional Pemberdayaan Masyarakat (National Programme for Community Empowerment)
PSE UGM	Pusat Studi Energi (Center of Energy Studies) Universitas Gadjah Mada
PUE	Productive Use of Energy/Electricity
PVVP	Photovoltaic Village Power or known as Pembangkit Listrik Tenaga Surya (PLTS) Terpusat
RE-Map	Rural Electrification Map
Rural PNPM	Rural component of PNPM
SI	Social institutions (public facilities serving the community)
SMS	Short Messaging Service
TOT	Training of Trainers
TSU	Technical Support Unit
UPT	Unit Pelaksana Teknis (Technical Implementation Unit)
USAID	U.S. Government agency that works to end extreme global poverty and enable resilient, democratic societies to realize their potential
VMT	Village Management Team

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A photograph of a paved walkway in a tropical setting. On the left, there are utility poles with power lines and a building with a corrugated metal roof. The walkway is bordered by a white stone railing and lush greenery, including palm trees and flowering bushes. The sky is blue with scattered white clouds. A blue circular graphic is overlaid on the right side of the image, containing text.

**Energising  
Development is a  
global energy  
partnership**

to promote sustainable access  
to modern energy services in  
developing countries.

## Introduction

GIZ, through EnDev Indonesia project, supports renewable energy applications in rural areas as means to promote climate-sensitive universal access to energy. Support is currently focused on micro-hydro power (MHP) and photovoltaic (PV village power/PVVP) connected to micro-grids, thereby contributing towards greenhouse gas (GHG) mitigation efforts in Indonesia within a rural context. The renewable energy technologies deployed are specifically geared towards displacing any current use of fossil fuels and/or minimising any future installation of fossil fuel-based technologies specifically for electrical energy.

Rural electrification remains a challenging social service in developing countries, absorbing significant resources, placing high expectations on rural communities and is facing sustainability concerns. Rural electrification in Indonesia is implemented through various initiatives either by the government or non-government organisations.

EnDev Indonesia focuses its support for KESDM's programmes which competence mainly on micro-hydro and solar power technologies. Additionally, during this year, a preliminary discussion to also support bioenergy has been pursued. From the vast learnings in both MHP and solar power facilities, KESDM sought to replicate the successful approach towards the bioenergy-based off-grid electrification programme.

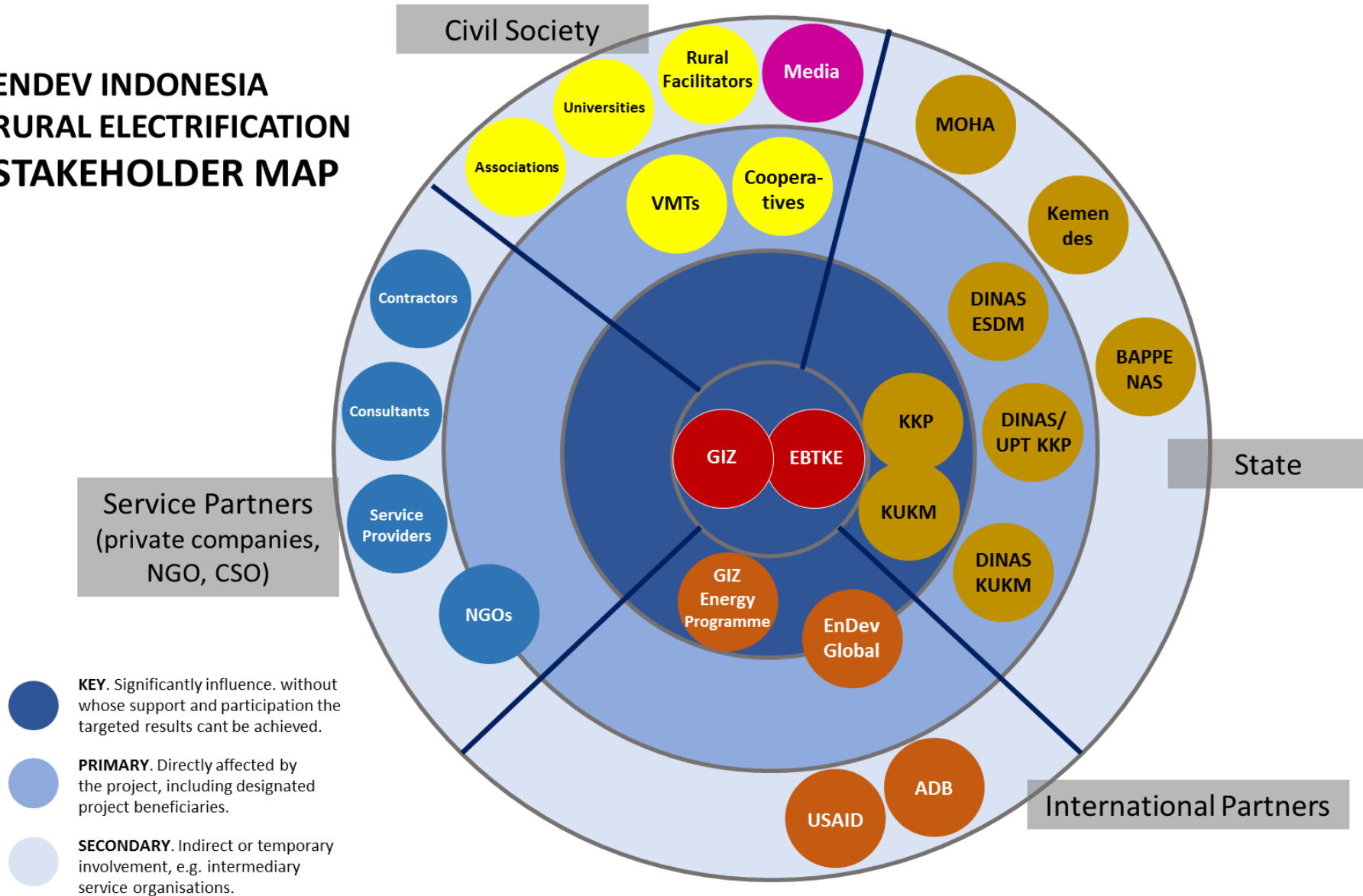


**A 50 kWp PV micro-grid in Long Layu Village, Nunukan District, Kalimantan Utara built by KESDM under 2014 budget  
(Source: EnDev ID, GIZ)**

In addition to the cooperation with KESDM, the project also diligently engages and builds cooperation with other institutions such as the Ministry of Fisheries and Marine Affairs (KKP) and the Ministry of Cooperatives and Small Medium Enterprises (KUKM). With KKP, EnDev Indonesia works on capacity building measures for the field facilitators assigned in 25 small outer islands provided with PVVP system constructed by KESDM. Meanwhile, with KUKM, EnDev Indonesia supports through technical assessment for 9 MHP operated by local cooperatives and capacity building measures both in MHP management and business development.

Stakeholders map for EnDev Indonesia project (Source: EnDev ID, GIZ)

# ENDEV INDONESIA RURAL ELECTRIFICATION STAKEHOLDER MAP



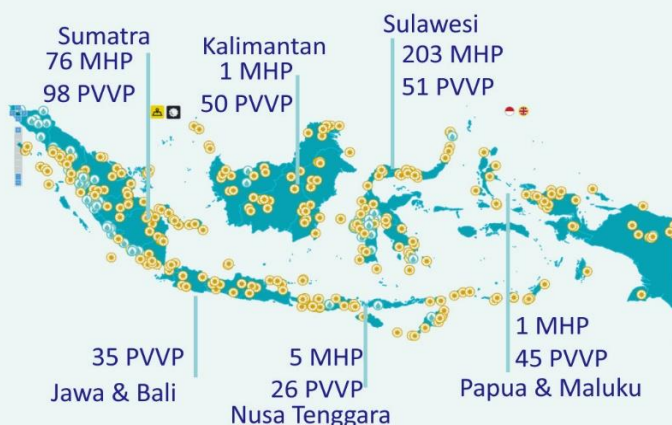
# EnDev Indonesia in numbers



**591** Sites with renewable-energy based power generation supported by EnDev Indonesia



Consist of **286** MHP  
and **305** PVVP



Total installed capacity :

**5.1 MW** MHP

**6.7 MW<sub>p</sub>** PVVP



These systems provide electricity for:

**60,877**  
households

**273,947**  
people

**1,514**  
public facilities

**2,821** rural bussiness

The average operational hour :

**17** hours/day (MHP)

**20** hours/day (PVVP)



**320** Wh/day is the average energy allocation per household in PVVP sites



Common electrical appliances used by households are light bulbs, television and fan



Only **46%** of the sites have GSM coverage



Average distance from village to the closest town

**62 km**



Institutional form of management

**98%**  
Informal team known as VMT



**2%**  
Cooperatives



The average salary of one VMT member per month is

**Rp 270,000**

The average tariff per household per month is **Rp 19,000**



## Capacity development activity in 2015

**83** on-site training for VMT

**3** training of facilitators

**3** on-site business development training for cooperatives



### Outreach

**20** Technical specialists

**25** Field facilitators

**59** Cooperative members and entrepreneurs

**330** VMT members

**1,600** Villagers socialised to RE mini-grid



\*All numbers are the total number achieved since 2009 till 31 December 2015  
\*Reduction and adjustment factors according to EnDev Global counting mechanism are not considered

## Key Indicators Achievement

By the end of December 2015, EnDev Indonesia has supported a total of **591** sites consisting of 286 MHP and 305 PVVP systems, commissioned under various programmes and initiatives. The project conducts biannual monitoring and updating of its primary indicators: people reached, social institutions or public facilities connected, and productive use of energy application connected.

Up to end of the reporting period December 2015, EnDev Indonesia has supported the provision of electricity for **273,947 people**, **1,514 public facilities** (such as school, religious building, health centre), and **2,821 rural businesses** (which ranging from common kiosk or “warung” to bigger business like agro-processing). These numbers have not considered counting adjustments applied by EnDev Global. Of the total number of micro-grid sites supported, 53% were implemented under DJEBTKE programme, 44% under PNPM initiative, and around 3% under KUKM and other smaller initiatives.

EnDev Global has a unique counting methodology which adjusts the indicator values reported in order to conservatively reflect the impact this global programme has in terms of providing people with access to sustainable energy. Therefore, there are distinctions specifically in determining the number of people reached as follows:

**“Expected”** reflects the number of people as per pre-construction planning data. This number is often higher than actual people connected upon commissioning of the off-grid facility.

**“Surveyed”** reflects the actual number of people connected to the electricity facility, via a distribution micro-grid, recorded during post-construction site surveys. For this EnDev Indonesia uses its KPI methodology.

**“Achieved”** reflects the number of people reached after the reduction of various factors. These include sustainability factor, windfall factor and pre-electrification factor. These factors are prescribed by the EnDev Global.

For most supported sites, a key performance indicator (KPI) survey is conducted, which provides baseline data for the site. This baseline data is captured in a database and available for subsequent follow-up surveys.

EnDev Indonesia does not count the actual number of individuals in a beneficiary village. This will be logistically challenging. Instead the project records the number of households in the village and assumes an average household size of 4.5 people as per national statistics.

## EnDev Indonesia Activities in 2015

In the review year, the project worked mainly in three areas: capacity development, technical assessment and sustainability monitoring, and knowledge management.

### CD | Capacity Development

Good operational management will improve the power system sustainability. Well-trained operators and managers know how to run and maintain the system and prevent the power plant from bad-use and damage. Appropriate tariff that is agreed on and respected by the village community will provide the necessary funding for maintenance and repair. A sanction system ensures that the tariff is fairly applied. EnDev Indonesia strengthens the local stakeholders in forming such village management team (VMT) and provides necessary training for a sustainable operation. Not only VMT, the project also extends its capacity development measures for the field facilitators and cooperative management.



Entrepreneurship training for cooperative members.  
(Source: EnDev ID, GIZ)

Electricity is a vital precondition for a number of production processes. Many electrification projects have shown that productive uses of energy can be a significant driver for economic growth in rural areas. Such productive use of energy may comprise agricultural, commercial and industrial activities involving electricity services as a direct input to the production of goods or provision of services.

Research findings indicate that productive uses of energy and income generating activities need to be promoted proactively, and investments in electricity infrastructure accompanied by interventions to specifically foster entrepreneurial activities. With this background, EnDev Indonesia facilitates capacity building measures on entrepreneurship topic for the community, cooperative members, and owners of existing rural businesses.

## SM | Technical Assessment and Sustainability Monitoring

Achieving sustainability requires consistent attitude for small and continuous improvements. In management practises, continuous improvement is guided by several principles<sup>1</sup>. One of them is to speak with data and manage by facts. This particular principle is highly influencing sustainability monitoring activities in EnDev Indonesia.

Government-driven rural electrification programmes in Indonesia do not provide funding for independent technical assessment after commissioning took place. Critical issues are often overlooked and the performance of the power plants is not thoroughly checked. EnDev Indonesia physically inspects and test-runs the electricity generation systems based on a comprehensive approach called the **Micro-grid Service Package (MSP)**. Smaller repairs will be done on site, while critical issues will be communicated to the project funders and villagers for further follow-up.

Early identification of construction faults and weak points minimizes the risk of greater damage. Guidelines for troubleshooting enable the villagers to repair and improve their systems step by step. Performance testing verifies the power output of a site and shows potential for additional connections and productive use potential.

Once a power facility is officially handed over to the village communities, its operation requires a support structure. Such structure, however, is not easily available yet. Therefore, many of such sites face problems in the first year due to insufficient quality of equipment and/or lack of capacity building.

The project also attempts to bridge this shortcoming through biannual operational survey and SMS gateway called **Energi Desa** to also facilitate assistance for the management teams when problems occur.



Technical review of micro hydropower.  
(Source: EnDev ID, GIZ)

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<sup>1</sup> Kaizen is the practice of continuous improvement which was introduced by Japanese.

## KM | Knowledge Management

EnDev Indonesia strives to consolidate and institutionalise capacity development for the Indonesian rural electrification sector. Development progress and details of each micro-grid site have been documented in a database which is used extensively as source of data and learning tools. The project has collected information on both MHP and PVVP installations across Indonesia. This information also contains site coordinates, number of connections, funder and year of construction, and selected photographs from the field.

Graphically displaying the different sites, on an interactive map along with other basic data, provide a visually appealing platform to raise awareness and to share information in a user-friendly way. Such interactive digital map called **RE-Map** (<http://remap-indonesia.org/>) was first launched in 2014. Since then, the map has been continuously updated and 596 sites are listed on the map to be updated.

Learnings from years of support within the rural electrification sector are enormously and highly valuable. EnDev Indonesia commits to document these learnings methodically so that a constructive exchange among actors could take place which will improve future initiatives, particularly in rural electrification using renewable energy technologies. Various knowledge products in the form of reports, guidelines, posters, and videos are listed in Annex B of this report.



EnDev Indonesia applies a unique identification code to each site comprising the province name and number.  
(Source: EnDev ID, GIZ)



## Overview of Activities in 2015

No	Code	Activity/Title	Timeline	Output Documents
1	CD	TOT VMT for facilitators	19 - 25 April 2015	Training module (VMT training manual)
2	CD	TOT BCD for facilitators	29 July to 4 Aug 2015 1 - 5 October 2015	<ul style="list-style-type: none"> <li>▪ BCD training module</li> <li>▪ Business plan canvas model per site</li> </ul>
3	CD	On-site BCD training for cooperatives	Nov 2015 - May 2016	BCD training module
4	SM	MSP for PVVP (including on-site VMT training)	July - December 2015	83 technical summary reports (confidential) Executive report (confidential)
5	SM	MSP for MHP (including on-site VMT training)	June 2015 - Mar 2016	(ongoing activity, 23 technical summary reports and 2 executive reports for DJ EBTKE and KUKM expected)
6	SM	Biannual telephonic KPI survey	Jul 2015 and December 2015	2 survey reports
7	SM	Operationalisation of Energi Desa	Continuous activity	Leaflet of Energi Desa
8	KM	RE-Map updating	Sep - Nov 2015	Updated map
9	KM	VMT Training Manual	August 2014 - August 2015	Officially launched and handed-over to DJ EBTKE in August 2015 during EBTKE Conex

## Networking Events Participation

No	Event	Organiser	Role	Date	Location
1	Nigerian Energy Support Programme (NESP): Visit of Nigerian Delegation to Indonesia	IIEE	Host	January 2015	Jakarta
2	Hydro Empowerment Network 2 <sup>nd</sup> Annual Gathering	HPNet	Participant	February 2015	Bandung
3	Training Program: Micro Hydro Power for Rural Development in ASEAN Member Countries	NAM CSSTC	Resource person	24-31 March 2015	Padang
4	Field visit to Biogas Power Plant in Rokan Hulu, Riau as a field study	GIZ	Participant	20-22 May 2015	Rokan Hulu
5	Study Tour on Small PV-Applications for Rural Electrification Stakeholders	GIZ	Organiser	7 - 14 June 2015	Germany
6	Benchmarking meeting with Rumah Pintar Petani	GIZ	Organiser	15 October 2015	Yogyakarta
7	Workshop: PV Decentralisation	EKONID	Participant	3 November 2015	Jakarta
8	Synchronisation Meeting for Rural Electrification	Kemendes	Resource person	10 November 2015	Jakarta
9	ASEAN Training of Trainers	GIZ	Participant	15-21 Nov 2015	Malaysia

<b>10</b>	Review Meeting on Cooperative Business Development in Renewable Energy Sector	KUKM	Resource person	17 November 2015	Jakarta
<b>11</b>	Synchronisation of DJ EBTKE Programmes (presenting Energi Desa)	DJ EBTKE	Resource person	30 November 2015	Jakarta
<b>12</b>	National Workshop on the Effectiveness of Economic Infrastructure Management in Inhabited Outer Small Island	KKP	Facilitator for FGD	17 December 2015	Jakarta



The government of Indonesia develops around **20 micro hydro power plants every year** using renewable energy technologies and operated by the community

# 1. Facilitator Training

Facilitator training for “strengthening community participation through effective assistance in programme management of PV micro-grid in small outer islands” was conducted in Jakarta on 19 - 25 April 2015. This activity is part of the cooperation with the Ministry of Marine Affairs and Fisheries (KKP) in supporting the small islands development programme. The training aims to improve the facilitator’s capacity and skill in the area of community facilitation and PV micro-grid management. As many as 25 field facilitators participated in the training who mostly are young graduates with passion in community development.

A facilitator training on village electricity management was provided to **25** facilitators assigned in 25 small outer islands with PV micro-grid.



First-hand experience in learning the aspect of living on the island. (Source: EnDev ID, GIZ)

The training programme comprises three main sessions, namely community facilitation, PV micro-grid operation and maintenance, and PV micro-grid management. A one-day field study to Untung Jawa Island, in Kepulauan Seribu District, was also part of the training session to give a first-hand working experience in an island.

The one-week training was concluded with a gala dinner attended by Director-General of Marine, Coastal and Small Islands (KP3K), Director-General of EBTKE, and Director of Energy Programme Indonesia/ASEAN. During this event, the honourable guests officially inaugurated the 25 facilitators to start working in the 25 small outer inhabited islands where the PV micro-grids were installed.

## 2. Training on BCD

There were two types of business capacity development (BCD) training conducted in 2015: a) training of trainers (TOT) for KKP facilitators and b) on-site training for cooperatives.

### TOT BCD Training for KKP Facilitators

GIZ facilitated two 5-day trainings on business capacity development as part of our support to the small islands development programme of KKP. The objective of the training was to equip the 25 facilitators, who previously had received training on VMT, with knowledge and skills related to small-scale business development. Such skills are necessary for the facilitators to assist the target community in the small island villages with income generating activities.

The training method used was the **CEFE Business Canvas Model** which covers 6 topics:

- basic of entrepreneurship,
- introduction to rural businesses,
- capital investment,
- market assessment,
- financial and accounting aspects, and
- introduction to business entity.



Participants learned to create a business plan using CEFE Business Canvas Model.  
(Source: EnDev ID, GIZ)

During the training session, facilitators should develop a business plan based on the local potential. This business plan, then, was submitted to KKP for approval and allocation of funds.

The first training was held in Makassar, Sulawesi Selatan on 29 July to 4 August 2015 and participated by 13 facilitators assigned in the southern part of Indonesia. The second training was held in Bali on 1 to 5 October 2015, attended by 12 facilitators assigned in western part of Indonesia. Several months after the training, small businesses began to grow in some sites, such as in Linggayan Island, Sulawesi Tengah with shredded fish production.

## On-site BCD Training for Cooperatives

Under the agreement between the Ministry of Cooperative and Small Medium Enterprises (KUKM) and GIZ, from 10 November until 17 November 2015, EnDev has successfully conducted 3 of 9 on-site BCD trainings for cooperative members in Nusa Tenggara Timur and Kalimantan Barat provinces. A total of 59 cooperative members were participated in the training of which 18% were women. These cooperatives are the beneficiaries as well as the management of the MHP plant built under KUKM's programme.

A total of **59** rural entrepreneurs and members of **3** cooperatives were trained on business development.

Despite the difference in method and focus of training, principally the training materials between in-class TOT and on-site training are the same. In the on-site training, the participants were analysing their own business and market potential, then apply it for redesigning their business plan using the CEFE Business Canvas Model. This model helps the participants to experience a real business development process and be able to develop a map of business potential and opportunities. By the end of the training, the participants were also able to make a quarterly business projection for one-year period and redesigned the marketing and promotion targets.



On-site training on business development was provided to rural entrepreneurs and cooperatives members. (Source: EnDev ID, GIZ)

### 3. Study Tour on Small PV-Applications

As part of Endeavor Indonesia's continuous commitment to assist key partners in the sustainable development of the renewable energy based power plants, EnDev Indonesia organised a study tour for rural electrification stakeholders to Munich, Germany on 7 - 14 June 2015. The trip coincides with the 4<sup>th</sup> Symposium on Small PV-Applications: Rural Electrification and Commercial Use (9 - 10 June) and Intersolar Expo 2015 (10 - 12 June). A total of 7 persons participated in this activity coming from various organisations, they are DJ EBTKE, PT Gerbang Multindo Nusantara, and Bank Pembangunan Daerah of Nusa Tenggara Timur province.



Study tour is an effective learning platform among participants as well as exposing to international context. (Source: EnDev ID, GIZ)



Discussion on the implementation of small PV systems and distribution strategies.

(Source: EnDev ID, GIZ)

The objectives of the study tour were to learn from the experience of other countries in the implementation of small PV systems and distribution strategies, as well as to get an overview of existing small PV applications, markets and the state of art technology, also to facilitate ideas and information exchange among invited delegates.

Through such study tour, communication and coordination among the participants were also nourished and it sets a good basis for better cooperation in performing daily tasks for achieving the mutual goals.



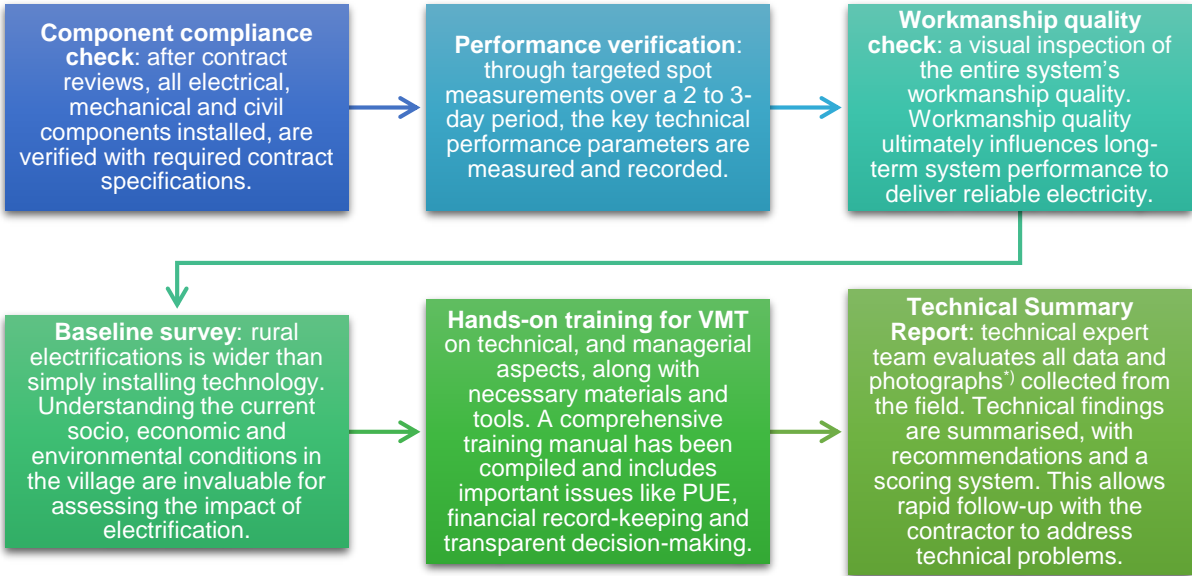


# 4. Micro-grid Service Package

Rural electrification infrastructure is costly and logistically challenging. Large volume of roll-out programmes of micro-grids often lack necessary technical follow-up. Even where superior quality technology is deployed, long-term sustainability still hinges on the ability of rural beneficiaries. In many instances, infrastructure is still installed with limited support for the rural community who is responsible for its operation, maintenance and administration. In the case of electricity generating infrastructure, this leads to technical failures, social dissatisfaction, and economic and financial losses.

Micro-grid systems are suitable for larger loads beyond lighting purpose, such as for productive activities, but require centralised management by skilled individuals.

The **Micro-grid Service Package (MSP)** includes a mix of technical and socio-economic measures which typically commencing immediately with the commissioning of the electricity infrastructure. It comprises technical check, on-site VMT training, KPI baseline survey, and encouraging productive use of energy (PUE) through rural businesses.



*\*) Each site has the collection of about 900 high quality photographs, including macro views, area overviews, community interactions and scenery. These are not only referred to as evidence for the technical assessment, but also provide a context for further analysis and materials for awareness and promotional activities. The key component of the data collection is documenting what is happening at the site including taking as many pictures as possible. These pictures should be enough to support any conclusion an engineer can come up with about the state of the installation site based on the survey data.*

## Implementation of MSP for PVVP

In 2013 and 2014, GIZ recruited international consultants which supported by national technical observer, to undertake the technical review and baseline survey of 112 and 110 (respectively) PVVP (photovoltaic village power or known as PLTS Terpusat) installed by different local contractors, on behalf of DJ EBTKE. The PVVP reviews were conducted at the specific written request of EBTKE and the results were treated in strict confidentiality.

Based on the high quality of the PVVP reviews undertaken in 2013 and 2014, EBTKE requested GIZ to carry out identical reviews for PVVP sites in 2015. The 87 PVVP sites constructed by DJ EBTKE in 2014 budget year were technically almost identical to the previous years. The majority of 28 systems are 15 kWp capacity installed (with 144 kWh battery storage and 15 kW inverter capacity), while the remaining sites are larger installations ranging from 30 to 100 kWp. In July until October 2015, 83 technical reviews were conducted, with the remainder cancelled due to logistic barriers. As such, 95% of the PVVP systems contracted by EBTKE were reviewed.

For this technical review, GIZ developed detailed checklists and questionnaires, which compiled the **Inspection Guideline for PVVP** (GIZ, 2015) which was revised in 2015. In addition to the technical review, the consultants also provided on-site VMT training which responsible for the operational management and administration during the 2-day visit. The national consultants who conducted the technical reviews and on-site training were intensely groomed and trained by GIZ.

The review findings were evaluated and summarised into an individual technical summary report per site with the scoring system which allows comparison among sites. These individual reports also presented the overviews of poor workmanship and recommendation for improvement and were submitted to DJ EBTKE for further follow-up.

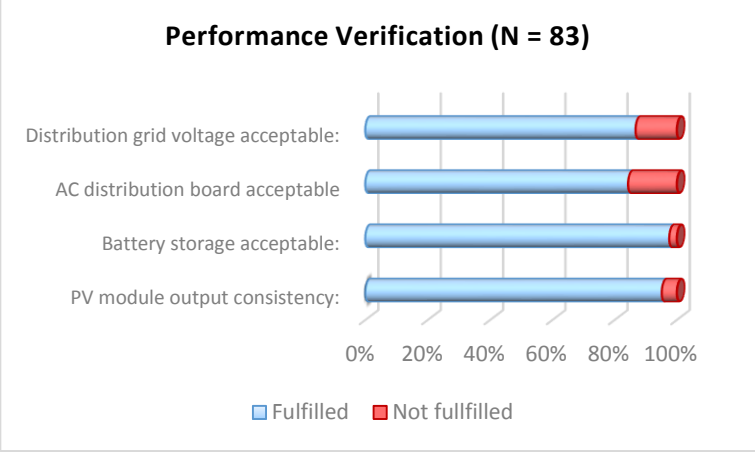
Through MSP for PVVP 2015, an extensive support for **83** PVVP systems under DJ EBTKE's programme was delivered with valuable results and findings.



A 30 kWp PV micro-grid in Luang Barat Village, Maluku Barat Daya District providing electricity for 145 households and 8 public facilities.

(Source: EnDev ID, GIZ)

In general, the overall performance of the contractors slightly improved from 78% in the previous year to 80%. The technical specifications of equipment ordered for the installation at the PV-VP sites are considered to be acceptable. Major faults, however, result in malfunction of the plants, generally caused by very poor workmanship during installation, lack of commissioning, material defect or equipment discrepancy. There were 7% of the inspected sites not operating at the time of the visit due to some technical reasons.



Evaluation criteria and guideline have been developed to conclude the system’s overall performance. The analysis shows good and acceptable electricity output at the three main parts: PV module output consistency, battery storage, and distribution voltage.

Further findings from the technical evaluation are summarised in the **Final Executive Report of MSP for PVVP 2015** (GIZ, 2016) which is made available for DJEBTKE with confidentiality.

Source: Final Executive Report on Technical Review of PV-VP 2015 (GIZ, 2016) (confidential)

After conducting the technical review in three consecutive years, the project has gained considerable understanding of what is required to ensure that these systems in Indonesia are designed properly, built and maintained properly. The key here is **capacity building** of the relevant stakeholders, namely central and local government, villagers, contractors, and suppliers. Dissemination of the appropriate knowledge and training need to be targeted for the intended audience in order to maximise the transfer of knowledge. However, a basic level of understanding must first be made available to all of the stakeholders involved.

MSP methodology (checklists and evaluation criteria) is **sufficiently robust** to assess the installation quality and technical performance of PV micro-grids, if used by **inspectors and evaluators with basic (to medium) knowledge**, with **technical experience in the field** (where no engineers required). The way forward would be to transfer the knowledge and institutionalise the approach into the DJEBTKE’s evaluation initiative.



Technical review visit to Jambi was troubled with the smoke disaster. (Source: EnDev ID, GIZ)

## Implementation of MSP for MHP

Within the annual budget of 2014, DJ EBTKE has launched tenders for the construction of 14 MHPs with micro-grid across Indonesia, as part of its greater rural electrification programme. An MSP for MHP initiative was designed to support these systems.

Additional to the 14 MHPs built by DJ EBTKE, EnDev Indonesia also support KUKM's electrification programme. Different from DJ EBTKE approach in its infrastructure development, KUKM encourages the productive utilisation of energy generated from the MHP. In 2014, the Deputy of Production under KUKM granted 9 cooperatives to develop MHPs for running their businesses. These rural businesses vary from agro-processing to carpentry, which promote the utilisation of local potential such as coffee, rice, etc.




Assessing the civil work of a micro hydro power requires thoroughness and carefulness. (Source: EnDev ID, GIZ)

MSP for MHP 2015 was  
designed to support **23**  
MHP systems under  
DJEBTKE's and KUKM's  
programmes.

Considering the large number of MHPs which need to be reviewed, some of these sites were not completed by the end of 2015, and this activity has not been concluded until this annual report is compiled. Initial indication towards the evaluation of MHP schemes is how natural factors significantly influence the construction and performance of the MHPs. Several sites suffered from the long dry season, which has lowered the water flow, thus reducing the generated power from the schemes.

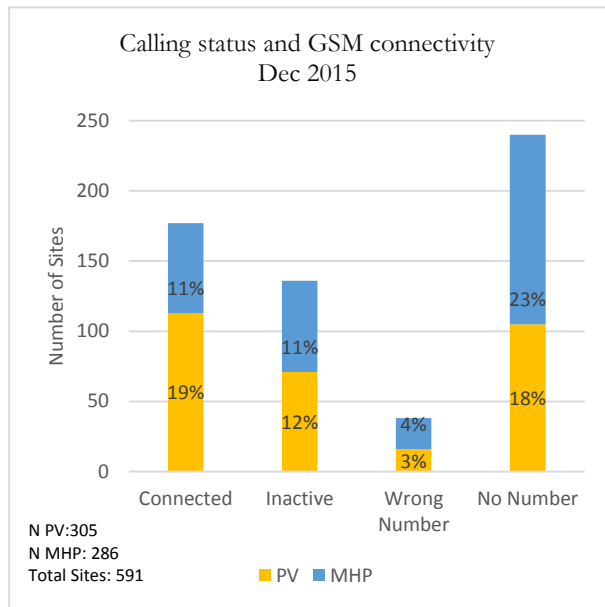
Logistical challenge also caused delay in delivery of MHP key components to the sites, such as turbine and penstock. Further findings and lessons learnt are anticipated to be presented in the second quarter of 2016.



**45%** of the PV micro-grid sites had **no access to GSM coverage**, hindering the potential use of technologies that could help with enhanced O&M.

## 5. Biannual KPI Phone-Survey

In order to provide sufficient data and being able to effectively analyse and fix the cause of the problems, EnDev Indonesia has conducted monitoring activities both regular and incidental. While KPI survey is used as a discreet baseline data for each supported micro-grids, an operational survey by phone is performed regularly every 6 months.



Source: Report on Operational Status of Micro-grid 2015 (GIZ, 2016)

This biannual KPI phone-survey aims to update the micro-grids operational status and get more insights from their operating condition. It gathers brief technical, managerial, and social data which directly affect micro-grids. The survey used a compact version of KPI survey and took up to 30-minute phone interview for each respondent. The first phone survey was conducted in-house in December 2014 which led to two survey attempts in 2015, each on July and December.

In addition to EnDev's regular monitoring update, financial and technical parameters are becoming more relevant to be investigated to assess the ability of the sites to operate in the long run. GIZ's Programme on Poverty-oriented Basic Energy Services, HERA, was seeking to conduct a study on the financial performance of micro-grids, in order to understand if micro-grids are operating sustainably. With wide coverage of micro-grid sites, on December 2015 HERA and EnDev Indonesia sought to gather financial and technical data from the sites and analyse it.

### Survey findings

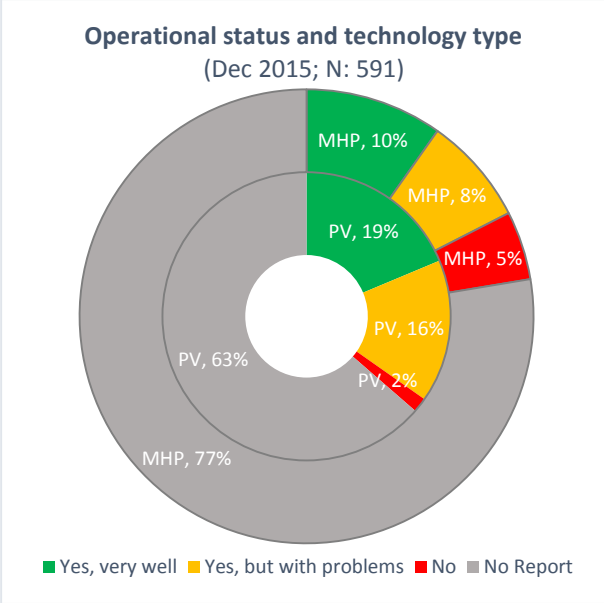
From the survey, a large portion of sites are residing in the area with no or limited GSM coverage. GSM network connectivity is only available in 46% of 591 sites. This makes communication via GSM network challenging, even less favourable for remote monitoring system.



**GSM coverage quality;** green dots represent good connectivity where at least 80% of sites in the region are covered, yellow dots represent the regions where 50% - 80% are covered, and the red dots show that less than 50% of the supported sites in the region are without GSM coverage.

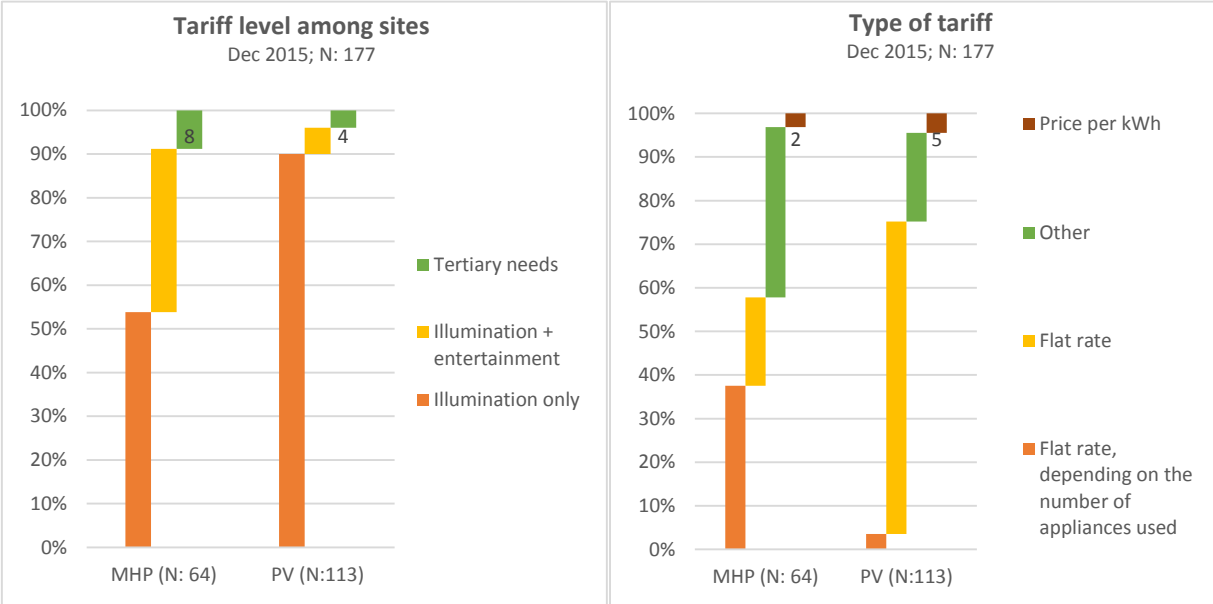
There are some notable numbers of non-operating sites, both in MHP and PV systems. In MHP case, it was caused by the dry season during the survey and some defects in generator. Meanwhile, for the PV system, the major cause of disrupted systems is the inverter defects. Although there is only a small number of non-operating sites reported in this survey, preventive action should follow, such as selecting good quality components, as well as a better design and installation.

Based on the survey, most disruptions in the MHP system were caused by a long dry season. The amount of water flow for MHP is significantly decreased and directly affected the MHP performance. Aside from natural interruptions, it is also observed that there are also technical shortcomings in the generator and the turbine. Meanwhile, for the micro-grid PV, inverter errors are dominating the problem of PV technical deficiencies.



Source: Report on Operational Status of Micro-grid 2015 (GIZ, 2016)

Another interesting observation shows that the level of electricity for PV micro-grid is dominated by the basic tier of electricity, i.e. illumination. However, in the meantime, electricity in MHP micro-grid appears to give more possibility for additional appliances. The level of electricity supply may lead to different tariff setup in the micro-grid management. PV micro-grid which has most access for illumination also has a significant portion of the monthly flat tariff, whilst MHP has more diverse tariff setup and various level of electricity access.



Source: Report on Operational Status of Micro-grid 2015 (GIZ, 2016)

## 6. Operationalisation of Energi Desa

Scarcity in technical and managerial competence in rural area is worrying, as implementation of rural micro-grid accelerates. The rapid development which involves various ministries and institutions demand coordination between partners from policy level to the actual users of the facilities. Effective communication is crucial to be able to overcome challenges in micro-grid implementation.

Energi Desa aims to enable knowledge exchange among stakeholders such as micro-grid operators, policy makers, experts, and private sectors, which targets to strengthen their knowledge exchange and communication in the field of rural micro-grid. By enabling community of practice, adoption of technology will be fostered.

Energi Desa is a communication platform which evolved from an SMS monitoring tool in 2013 to knowledge exchange platform since October 2014. The communication platform has two interfaces, which consist of SMS and mobile application in Android OS. The SMS platform serves the basic service for rural communities, while mobile application is targeting community of experts involved in Energi Desa. The mobile application is an improvement from previous setup that requires the experts to access webpage to participate in the conversations in Energi Desa. Such application is expected to ease the process for the engaged experts.

At the moment, Energi Desa focuses on EnDev-supported sites based on availability of baseline data, e.g. GPS location, management team, micro-grid capacity and specification, as well as data on village social-economic condition. These baseline data ensure that the moderators are knowledgeable about the sites and understand the context. In December 2015, the platform has reached **811 users**, of which 190 users access it through the SMS system. It has received **738 incoming messages**, and disseminated information by sending almost **17,000 messages** to all subscribed users. As many as **187 questions** with 241 responses have been addressed.

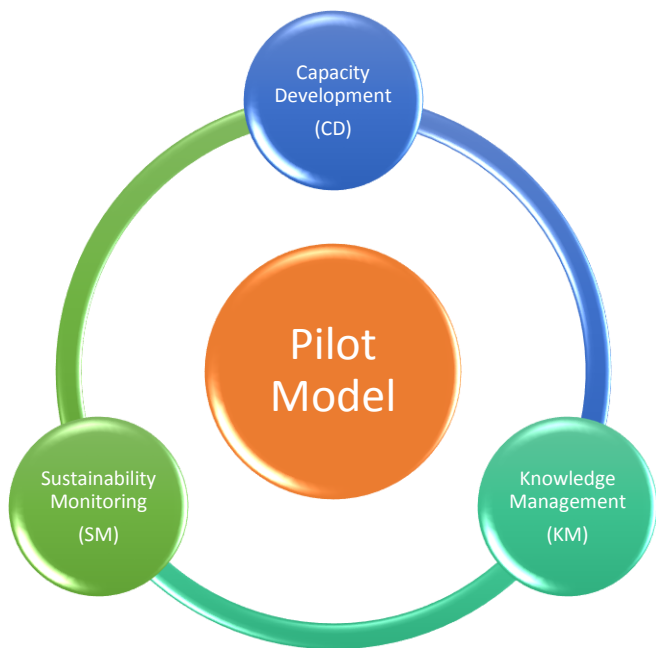
Pressing challenges for Energi Desa are to engage more experts and policy makers to participate in the platform and to integrate Energi Desa into DJ EBTKE information system. Designed to be a crowdsourcing platform, it depends heavily on the community interactions. DJ EBTKE has facilitated the introduction of Energi Desa to the provincial government during Synchronisation of DJ EBTKE Programmes on 30 November 2015. Additionally, DJ EBTKE initiated the idea to incorporate Energi Desa into its new setup of information system which comprises of rural micro-grid proposal, planning, monitoring, and evaluation. Energi Desa will complement as a monitoring tool that captures situation beyond technical performance. Whilst technical data will be monitored through remote monitoring system. This ongoing development is a good news for monitoring and evaluation process in rural micro-grid sector.



Socialising Energi Desa application in villages with good GSM coverage. (Source: EnDev ID, GIZ)



## 7. Outlook for 2016



Area of activities in 2016. (Source: EnDev ID, GIZ)

In order to understand the technical performance as well as socio-economic aspect of the micro-grids, the project will implement regular (biannual) survey and an assessment of PV micro-grid technical performance in selected sites.

Whereas under knowledge management field, the project will mainly focus on developing two knowledge products related to guideline on the good and bad of PVVP system installation and a practical guide regarding management of a micro-grid system.


All the above measures will nicely be put together in a couple of pilot regions to demonstrate the best practices specifically in PV micro-grid. Such pilot region should serve as a model for better sustainable renewable energy based on rural electrification with micro-grid.

EnDev Indonesia project foresees to emphasise on sustainability measures and transferring the established methodologies to DJ EBTKE and other relevant stakeholders. The area of actions will encompass **capacity development**, **sustainability monitoring**, and **knowledge management** activities. One or more regions will be selected to be developed as a replicable pilot model. The guiding structure of the upcoming support is presented in the following diagram.

Under capacity development measures, the project will continue the support for KKP/KESDM facilitator programme in small outer islands which includes both village management team and business capacity development topics.



Proper household installation with appropriate grounding and energy limiter protected from the weather. (Source: EnDev ID, GIZ)

A photograph of a traditional Indonesian house at dusk. The house has a tiled roof and a wooden balcony. Several people are sitting on the balcony. The scene is dimly lit, with the sky showing a deep blue twilight. A blue circular overlay is positioned in the upper right quadrant of the image, containing white text. In the bottom left corner, a portion of a blue banner with yellow text is visible.

The average energy use of PV  
micro-grid community is  
**320Wh per household  
per day**, much lower  
compared to the Indonesian  
average of 4,320Wh per  
household per day\*

*\*PLN Statistics 2014, processed*

# Annex A: EnDev Programme Setting

Energising Development Partnership (EnDev) is a joint impact-oriented global programme of Germany, the Netherlands, Norway, Australia, United Kingdom and Switzerland, with additional co-funding from Ireland and the European Union. The Energising Development programme, started in 2005, has the objective of facilitating access to sustainable energy services to 14.3 million people in developing countries by 2018. Currently, EnDev is active in 24 low- and middle-income countries in Asia, Latin America and Africa.

The Energising Development Partnership (<http://endev.info>) is implemented and coordinated by GIZ. EnDev maintains an extensive public information sharing and knowledge exchange platform called <https://energypedia.info>.

EnDev Indonesia (EnDev ID), jointly implemented by KESDM (specifically DJ EBTKE since 2011 onwards) and GIZ, was launched in 2006 and has the objective to support access to electricity to 172,000 people, 900 social institutions, and 1000 small-scale rural businesses in Indonesia. In pursuance of these indicators, EnDev ID subscribes to two core philosophies:

- To support DJ EBTKE and other public or private rural electrification programmes in Indonesia towards sustainable access to electricity for rural communities, by complementing and strengthening these initiatives.
- To remain flexible and open in terms of rural electrification technologies and adopt a holistic approach that balances technical, social, economic and environmental aspects.

EnDev countries and technologies. (Source: endev.info)



## Annex B: List of Knowledge Materials

EnDev Indonesia produced a number of knowledge materials which are intended for internal use and also have been distributed externally to various stakeholders as well as be made available on the EnDev Indonesia website for download. The knowledge materials produced till 2015 are listed in this annex.

### Guides

Panduan Pelatihan Tim Pengelola Listrik Desa (GIZ, 2015)  
Inspection Guide for Photovoltaic Micro-grids (revised) (GIZ, 2015)  
VMT Training Manual - A Guide to Rural Electrification Trainers and Facilitators (GIZ, 2014)  
Multimedia DVD Version 3: All About MHP (GIZ, 2013)  
KPI User Manual for PVVP (GIZ, 2013)  
KPI User Manual for MHP (GIZ, 2012)  
Best Practice Guideline for Rural Electrification\_en (GIZ, 2011)  
Manual on Productive Use of Energy\_en (GIZ, 2011)  
Baik & Buruk dari Mini Hidro Vol 1 (ACE, 2009)  
Baik & Buruk dari Mini Hidro Vol 2 (ACE, 2009)  
Good & Bad of Mini Hydro Power Vol 1 (ACE, 2009)  
Good & Bad of Mini Hydro Power Vol 2 (ACE, 2009)  
Hydro Scout Guide (GTZ, 2009)  
Langkah Pembangunan PLTMH (GTZ, 2005)  
Panduan Singkat - Mengenal Lingkungan PLTMH (Entec)  
Panduan Spesifikasi Teknis (TSU, PNPM)  
Panduan Teknis Konstruksi PLTMH (TSU, PNPM)  
Pedoman Praktik Terbaik untuk Listrik Perdesaan (GIZ, 2011)  
Pedoman Singkat PLTMH (GIZ, 2011)

### Posters

Energi Desa Poster (Indonesian) (GIZ, 2015)  
Troubleshooting Guide for MHP Problems Poster (Indonesian and English) (GIZ, 2013)  
Troubleshooting Guide for PV-VP Problems Poster (Indonesian and English) (GIZ, 2013)  
Catchment Area Management for MHPs Poster (Indonesian and English) (GIZ, 2013)  
Guidelines for Village Management Teams Poster (Indonesian and English) (GIZ, 2013)

### Reports

Laporan Kerja Sama GIZ, KKP, dan DFW untuk Program di Pulau-Pulau Kecil Terluar (GIZ, 2016)  
Report on Operational Status of Micro-grid 2015 (GIZ, 2016)  
Final Executive Report on Technical Review of PV-VP 2015 (GIZ, 2016) (confidential)  
Final Report MHP Technical Review for KUKM 2014 (GIZ, 2015) (confidential)  
Final Report MHP Technical Review for DJEBTKE 2014 (GIZ, 2015) (confidential)  
Final Report Rural PNPM Institutional Strengthening for Renewable Energy (GIZ, 2015) (confidential)  
Dokumentasi Pengembangan Ekonomi Produktif Berbasis PLTMH (GIZ, 2015)  
Laporan Pelatihan Peningkatan Kapasitas Pelaku Usaha Koperasi Pengelola PLTMH (GIZ, 2014)  
Final Report Business Capacity Development Training for Cooperatives in MHP Community (GIZ, 2014)  
Final Executive Report on Technical Review of PV-VP 2014 (GIZ, 2014) (confidential)

Final Executive Report on Technical Review of PV-VP 2013 (GIZ, 2013) (confidential)  
 EnDev2 Impact on Sustainability - A Comparative Study (GIZ, 2013)  
 Productive Use of Energy - Findings of Pilot Project (GIZ, 2013)  
 EnDev Indonesia - Productive Use of Energy - Findings of Pilot Project (GIZ, 2013)  
 Survey on Key Performance Indicators for Indonesian Micro-hydro Power Sites (GIZ, 2012)  
 Benefit & Cost Study: Retrofitting the Standalone MHP into Grid-connected System (GIZ, 2012)  
 Grid in-feeding screening tool user manual (GIZ, 2012)  
 Indonesia PUE database introductory manual (GIZ, 2012)  
 Report: Indonesia - Sustainable PV Diffusion Alternatives (GIZ, 2012)  
 Survey Productive Use Potential (GIZ, 2011)

## Templates and Tools

PV-VP Technical Checklist templates (revised) (Indonesian and English) (GIZ, 2015)  
 PV-VP Technical Survey Summary template (revised) (Indonesian and English) (GIZ, 2015)  
 PV-VP KPI questionnaire (revised) (GIZ, 2013)  
 MHP KPI questionnaire (revised) (GIZ, 2013)  
 Spread sheet: Grid in-feeding screening tool (version 2) (GIZ, 2012)  
 Template: MHP Commissioning checklist and manual (GIZ, 2012)  
 Template: MHP Commissioning report (GIZ, 2012)  
 Template: MHP Pre-commissioning checklist and manual (GIZ, 2012)  
 Template: PUE Screening form (GIZ, 2012)  
 Tool: Treasurer Cash Book for MHP and PV-VP (GIZ, 2012)  
 Tool: Operator Log Book for MHP and PV-VP (GIZ, 2012)  
 Tool: Customer Book for MHP and PV-VP (GIZ, 2012)  
 Tool: Activity Book for MHP and PV-VP (GIZ, 2012)  
 Tool: Tariff Card for MHP and PV-VP (GIZ, 2012)

## Training Modules

Training Module: Micro-grid Service Package for PV-VP and MHP (GIZ, 2015)  
 Training Module: TOT on Facilitation and Village Management Team (GIZ, 2015)  
 Training Module: TOT on Business Capacity Development (GIZ, 2015)  
 Training Module: Rural Business Capacity Development (GIZ, 2014)  
 Training Module: Institutional Setup of Village Management Team for PV-VP (GIZ, 2013)  
 Training Module: Institutional Setup of Village Management Team for MHP (GIZ, 2012)

## Videos

No	Full Name	Content	Year	Languages
01.	<b>BCD Training: Capacity Development of Entrepreneurs and Cooperatives Managing MHP System in Sintang, Kalimantan Barat</b>	Capacity Development of Entrepreneurs and Cooperatives Managing MHP System is held under the cooperation between GIZ and KUKM in 9 location, one of them is in Sintang, Kalimantan Barat. Topic comprises four business management aspects namely marketing, production, human resources and organisation, and financial) using CEFE method. The output of the training is that the participants comprehend and able to create a measurable business plan. After training, it is expected that the productive activities run sustainably by utikising electricity generated from the MHP.	August 2015	Indonesian

02.	<b>Product Launch Indonesia-German Energy Cooperation</b>	On the gala dinner of Indonesia EBTKE Conference and Exhibition 2015 held on 19 August 2015, the Director General of EBTKE launched two guidelines on renewable energy and rural electrification management, with the titled: Renewable Energy Guidelines on Biomass/Biogas Power Project in Indonesia and Village Management Team Training Manual: a practical guide for rural electrification trainers and facilitators.	Dec 2015	Indonesian + English
03.	<b>Villagers of Napajoring Have Access to Electricity Now</b>	MHP Napajoring is part of power plant development for productive economy escalation programme that was built through the funding from the Indonesian Ministry of Cooperative and Small and Medium Enterprises and supported by the District Government of Tobasa.	Dec 2014	Indonesian + English
04.	<b>Capacity Building for Entrepreneurs of MHP Management</b>	The training purpose is to increase the competencies of rural entrepreneurs in relation to micro hydro power plant programme, and it is expected that there will be sustainability development in the productive use of energy through the utilization of electricity from the MHP.	Dec 2014	Indonesian + English
05.	<b>Technical Aspect of SMG</b>	SMG maintenance is important to ensure all components function well. Regular maintenance is the key factor towards sustainability.	Sep 2014	Indonesian + English subtitles
06.	<b>Catchment Area Management</b>	A natural forest provides many important services to its people. A stable and reliable water flow in rivers is ideal for micro-hydro power generation and it is directly related to the health of the forest.	Jun 2013	Indonesian + English
07.	<b>Global Hydro Workshop 2013</b>	The 5 <sup>th</sup> GIZ Micro Hydro Power Workshop was held in Indonesia from April 15 -22, with the support of the GIZ Sub-Sahara Sector Network and Energising Development.	Apr 2013	Indonesian + English
08.	<b>Productive Use of Energy</b>	Rural electrification has a purpose. That purpose is the improvement of livelihoods for rural communities on a sustainable basis with maximum positive social, economic and environmental impacts.	Nov 2012	Indonesian + English
09.	<b>Sustainability of Centralized Photovoltaic</b>	Centralised solar powered micro-grids are a viable alternative for many rural villages. Unlike small solar home systems, solar micro-grids can cater for many more appliances and encourage productive use of energy.	Jun 2013	Indonesian + English
10.	<b>Solar Energy to provide electricity to the community</b>	Solar energy maintenance and sustainable operation.	Jun 2013	Indonesian
11.	<b>Solar Energy in Solok</b>	Solar energy and the application of the monthly tariff system for sustainability.	Apr 2013	Indonesian
12.	<b>Micro Hydro Power Plant</b>	Electricity is a very efficient energy form for reducing work load, making tasks easier and providing access to education and entertainment.	Jan 2013	English
13.	<b>Administration</b>	Administration is activities related to record-keeping or book-keeping which are an essential part of the MHP management.	Jan 2013	English

14.	<b>Financial Management</b>	Financial management, done by the “accountant” who regulates and controls all MHP financial aspects, including book-keeping and reporting cash flow.	Jan 2013	English
15.	<b>Maintenance</b>	MHP maintenance is important to ensure all components function well, unanticipated breakages are avoided and electricity supply remains stable. Regular maintenance is the key factor towards sustainability.	Jan 2013	English
16.	<b>Electricity Utilisation</b>	Appropriate electricity usage can improve the quality of live in rural communities. They can extend their productive or entertaining activities by using electricity.	Jan 2013	English
17.	<b>Commissioning</b>	Commissioning is the process of thoroughly testing the MHPs functioning. This consists of verifying construction is in line with the design and on the site testing of the equipment.	Jun 2012	Indonesian + English subtitles
18.	<b>Case-MHP Construction in Mesakada</b>	Progress report on construction MHP in Mesakada, April 2010. Construction work of the weir, penstock and powerhouse also planting pine trees work.	Jun 2013	Indonesian + English subtitles
19.	<b>Case-MHP Utilisation in Lisuan Ada</b>	With the right facilities and technology applied for utilization of rural energy sources, it can be expected that small scale industrial and productive activities will emerge providing a stimulus to the local economy.	Jun 2013	Indonesian + English subtitles
20.	<b>Current Meter</b>	Instructions on flow Measurement using current meter method. Current meter is a measuring instrument used to measure water flow in the river.	Feb 2013	Indonesian + English subtitles
21.	<b>Easy-flow</b>	Instruction to flow measurement using conductivity meter easy-flow. Easy-flow is measuring equipment to measure flow river.	Feb 2013	Indonesian + English subtitles
22.	<b>Flow Measurement by Float Method</b>	Flow measurement by float method. This is an indirect method to measure the flow, because it only measures the stream velocity by measuring the time needed for the floater to pass a distance that is set on a river.	Feb 2013	Indonesian + English subtitles
23.	<b>Head Measurement by Plastic Tube</b>	Head measurement by tube filled with water method. This method is better used if the other levelling tools are unavailable. Although accurate enough, this method needs more time to study and to design the MHP.	Feb 2013	Indonesian + English subtitles
24.	<b>Method of MHP Construction Implementation</b>	Construction method is one stage of work implementation in and MHP construction process. MHP implementation or construction work begins with the preparation of materials, setting the work quality standards, and method of work implementation.	Jan 2013	Indonesian + English subtitles
25	<b>Productive Use of Energy</b>	Other than being used for household purposes; lighting, TV, radio, etc., electricity can also be	Feb 2013	Indonesian + English subtitles

		used for productive business such as welding machine, milling and others.		
26.	<b>MHP Operational</b>	Before performing the operation, check first the intake, channel, forebay, penstock, and turbine components, so that the operation can run properly.	Feb 2013	Indonesian + English subtitles
27.	<b>MHP Institutional Setup</b>	Energy supply from Micro Hydro Power or MHP may provide a lot of benefits. The community can enjoy better lighting in the evening, get information from television or utilise the energy from MHP for business.	Feb 2013	Indonesian + English subtitles
28.	<b>Formulation of Village Regulation and Monitoring System</b>	The community must establish a clear and transparent tariff system, and requires the beneficiaries to follow the system. Sanctions should also be introduced for those who violate it.	Feb 2013	Indonesian + English subtitles
29.	<b>MHP Financial Management</b>	Management organisation is formed to ensure that the MHP will work well and also based on a good financial management.	Feb 2013	Indonesian + English subtitles
30.	<b>Head Measurement by Pressure Gauge Method</b>	Head measurement by gauge pressure method. Pressure gauge or manometer is a method to measure head or height difference using a water hose mounted in a water pressure gauge.	Feb 2013	Indonesian + English subtitles
31.	<b>Socialisation of Institutional Setup</b>	Institutional socialization MHP is one of the activities in the establishment and strengthening of village-level MHP. In the PNPM-LMP, socialization activities carried out during the construction still going on.	Jan 2013	Indonesian + English subtitles
32.	<b>Stake Out to Determine Water Surface Elevation</b>	Stakeout is the detailed measurement and placing of markers to be used as a reference during construction. This activity is very important because it determines the elevation of the water level, as a primary reference for civil structures of the MHP plant.	Jun 2012	Indonesian + English subtitles
33.	<b>Supervision and Monitoring of MHP Construction</b>	Technical Support Unit (TSU) as a technical team in PNPM-LMP (MHP), conducting supervision and monitoring on the MHP construction process periodically to direct or mentor the community in construction works.	Jan 2013	Indonesian + English subtitles
34.	<b>Tendering Process</b>	Tendering is one element of the Green PNPM project implementation procedure. The tender procedure adopts the same mechanism developed and applied under Rural PNPM.	Jan 2013	Indonesian + English subtitles
35.	<b>The Role of TSU within Green PNPM</b>	As an integral component of Green PNPM TSU works together with the Directorate General of Rural Community Empowerment, Dept. of Home Affairs as the project executing agency.	Jan 2013	Indonesian + English subtitles
36.	<b>Verification and MHP Potential Survey</b>	Verification of a proposal aims to examine and assess the feasibility of an activity proposed by a village to be funded under Green PNPM.	Jan 2013	Indonesian + English subtitles



## **Energising Development**

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