Ex-post Evaluation of EnDev Indonesia - mini-grids

Executive summary

From 2005-2019, Energising Development (EnDev) promoted electrification via hydro and solar powered mini-grids and small-scale biodigesters in Indonesia.
This project was implemented by Gesellschaft für Internationale Zusammenarbeit (GIZ).
In 2021, an exit evaluation study of the electrification component was carried out. This 2023 ex-post evaluation aims to understand the status of the Indonesian mini-grid market since EnDev's exit in 2019 and the developments since the 2021 exit study. The Energy Access Market Development (EAMD) tool is used for this this analysis.

EnDev contracted Edburgh consultants and Danish Energy Management to conduct an independent ex-post evaluation of EnDev Indonesia. The main evaluation questions were:

1) What is the current status of the market (demand, supply, and enabling environment)?
2) Which developments have taken place in the market between EnDev's exit in 2020 and now?
3) How can we explain these developments?

Ex-post studies are carried out at least 2 years after a project has been phased out. This desk-based analysis was carried out between August and November 2023. The evaluation is based on an analysis of 7 relevant reports and studies, and 8 interviews with important stakeholders. The report is based on absolute numbers of sales on country level. On global level, EnDev applies so called monitoring factors for attribution, additionally and sustainability and reports in adjusted numbers of people reached.

EnDev Indonesia	
Project period	2005 - 2019
Budget	EUR 12,760,000

Project results:

- Supported 1,034 renewable energy mini-grids, facilitating electricity connections for 125,182 households, 3,832 social institutions, and 2,959 rural MSMEs.
- Improved rural, off-grid renewable energy planning processes.
- Improved tendering processes for government projects.

Background

EnDev Indonesia supported community-managed mini-grids via various activities. These included technical assistance and policy advice; capacity building through training, mentoring and workshops; and developing the entrepreneurial skills of rural business owners and mini-grid managers. EnDev Indonesia was implemented in partnership with the Indonesian Government, in particular, the Directorate of New and Renewable Energy and Energy Efficiency under the Ministry of Energy and Mineral Resources (MEMR).

Supply-side observations

Several off-grid, renewable energy (RE) mini-grid business models exist in Indonesia. The current government's strategy focuses on mini-grid development led by the public utility company PLN. Some lessons learnt from the EnDev Indonesia project are less relevant today, as these were directly related to the community-managed model, which is currently less common.

EnDev Indonesia supported 1,034 mini-grids that the government funded from 2006 – 2017. These mini-grids were managed by local governments or community-owned enterprises. Since EnDev's exit, the government has handed over ownership and management of more and more mini-grids to public utility company Perusahaan Listrik Negara (PLN). Similar to the 2021 exit study findings, there is no private investment in the sector. This is partly due to low revenue and profit margins as a result of government-regulated tariffs. Regulated tariffs are generally lower than the levelised cost of electricity and often only enough to cover operational and maintenance costs, but not capital costs and major repairs. Public support is thus needed for longer-term mini-grid operation. There are cases of operators abandoning RE mini-grids once the main grid is available as tariffs are too low to justify continued operation.

Demand-side observations

Electrification rates in Indonesia are high. However, RE mini-grids can still offer a solution to meet last-mile electrification goals. The challenge of low electricity consumption and thus low feasibility of mini-grids remains. Productive use of energy initiatives can have a positive impact on electricity demand and the ability to pay for electricity.

The electrification rate in Indonesia reached 99.63% in 2022, as a result of MEMR's efforts to address last-mile electrification. However, rates are lagging in eastern Indonesia, especially in the East Nusa Tenggara and Maluku provinces. Remote areas lacking electricity access face challenges that can hinder the development of mini-grids. These include unclear land status and a lack of local skilled personnel for operation and maintenance tasks. Despite this, RE mini-grids are a viable option to meet electricity needs in off-grid areas. Sometimes, they offer more reliable electricity than on-grid options, where the frequency and length of power outages are high. Still, in some areas, the demand for electricity is lower than the supply, and customer willingness to pay electricity fees varies across areas.

Enabling environment observations

Interest in developing the photovoltaic (PV) and hydropower mini-grid sector is slowly increasing. Updated information on the status of existing mini-grids in Indonesia is needed. This information would help ensure well-planned sector development and measures to support the continued operation of existing mini-grids.

The 2021 exit study found a decreased government focus on RE mini-grids in the national strategy. However, the observations of this 2023 study suggest a renewed interest in off-grid solar PV and small hydropower plants as a means to achieve last-mile electrification and increase the share of renewable energy in the national energy mix.

Despite policy barriers for investment at a larger scale, such as complex permitting procedures, restriction of foreign investment and limited mechanisms for the further development of projects, the off-grid solar PV and hydropower mini-grids sector is steadily growing. However, operations and maintenance training is no longer available for staff managing existing mini-grids. This training was available during the EnDev Indonesia project period. MEMR now only offers this training for new mini-grids. This presents a challenge for local government and community-managed mini-grids. The staff operating these mini-grids does not always have the necessary skills to keep them running. This can result in mini-grids being abandoned. This 2023 study found it more difficult to access reliable and updated information on the performance of mini-grids in Indonesia.

Conclusions

The Indonesian renewable energy mini-grid sector is, in many ways, in the same situation as it was when EnDev was phased out in 2019. However, there are several indications of a positive trend within the sector today.

The integrated development approach pursued in the last years of EnDev Indonesia, where capacity building of mini-grid operators was coupled with capacity building of end users and local government participation, may aid the current political approach of supporting the mini-grid sector. EnDev Indonesia's approach helps to decrease the financial viability challenges of mini-grids and could, therefore, help mini-grids attract more private sector investment.