

# History Of Hydropower Energy In Indonesia

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The origins of small hydropower (SHP) in Indonesia trace back to the Dutch colonial era when the first small hydropower projects were built to supply energy for tea plantations in the 1800s. SHP development continued through the early 20th century, supplying electricity to both tea factories and the broader region. Key plants like Malabar and Pakar contributed to regional energy needs. After World War II and Indonesia's independence, these plants were nationalized, and although many continued to operate, several fell into disrepair due to lack of maintenance and operational inefficiencies.

The rise of fossil fuels in the 1970s shifted attention away from SHP. However, in the late 20th century, a renewed focus on rural electrification and renewable energy began to emerge. The period from the 1970s onward marked the revitalization of SHP in Indonesia, especially as a means to provide electricity to remote and underserved rural areas.

## Rural Electrification

Rural electrification has been one of the key drivers for SHP development in Indonesia. Beginning in the 1970s, micro-hydro schemes provided off-grid electrification for rural areas where national grid connections were unavailable or impractical. These projects were especially critical in isolated regions where electricity access was less than 10% at the time. Community-based organizations and NGOs, such as Yayasan Mandiri and later international organizations like Swisscontact and GIZ, played crucial roles in promoting micro-hydro development and capacity building in local communities.

Government initiatives, such as the National Community Empowerment Programme (PNPM) and the Energy Self-Sustained Village Program (DME), further boosted micro-hydro installations, providing a sustainable and community-owned approach to rural electrification. By involving local stakeholders in the planning, construction, and management of micro-hydro plants, these initiatives helped secure the longevity and sustainability of many SHP projects.

## Challenges

Several challenges have hindered the full realization of SHP potential in Indonesia. These challenges are largely regulatory, economic, and technical. Regulatory inconsistencies, particularly around electricity pricing and tariffs, have created uncertainty for investors. Frequent changes in regulations, including eight different pricing schemes since 2002, have made it difficult to create a stable investment environment. The role of the state electricity utility (PLN) has been both a support and a barrier, especially with its grid expansion plans sometimes displacing existing micro-hydro systems.

From an economic perspective, SHP projects require high upfront capital costs, which can be prohibitive for local businesses and small developers. The lack of access to affordable financing, combined with high interest rates on loans, has further complicated the financial viability of SHP projects.

Technically, SHP projects often face site-specific challenges, such as limited access to reliable water flow data, geological issues, and vulnerability to natural disasters like floods and landslides. Additionally, there is a lack of technical expertise in many rural areas, making maintenance and operational sustainability difficult.

## Government policy

The Indonesian government has made strides in promoting SHP through various policies, yet regulatory uncertainty remains a significant issue. Early regulations in the 2000s allowed for distributed small-scale generation but suffered from inconsistent pricing mechanisms. The introduction of MEMR Regulation No. 50/2017 and its subsequent revision through Presidential Regulation No. 112/2022 aimed to create a more attractive investment environment by setting ceiling tariffs for renewable energy, including SHP. However, the negotiation-based approach still leaves uncertainty, and many projects have struggled to secure financing as a result.

Additionally, the domestic market obligation (DMO) policy for coal and the reliance on fossil fuels for electricity generation have slowed the adoption of SHP. The government's focus on coal, both in terms of price caps and production quotas, has maintained a competitive advantage for coal-fired plants over renewable energy sources like SHP.

## Future directions for SHP in Indonesia

Looking forward, SHP remains an important tool for achieving rural electrification and supporting Indonesia's renewable energy goals. The paper suggests several key areas for reform and development:

- **Capacity Building:** Local expertise in SHP development and management needs to be strengthened. This could involve the creation of vocational training programs and technical certification for SHP operators, as well as greater institutional support for community-based projects.
- **Policy and Financial Support:** Robust, long-term policies for renewable energy pricing and procurement are essential for attracting investment. Additionally, financial de-risking mechanisms, such as concessional loans, risk-sharing instruments, and project guarantees, could help make SHP projects more financially viable.
- **Stakeholder Engagement:** The role of government, private sector investors, and local communities must be coordinated to ensure sustainable SHP development. The involvement of international organizations and development agencies has been critical in past successes and should continue to play a role in future initiatives.

Overall, SHP holds promise as a sustainable and community-driven energy solution for Indonesia. With the right regulatory frameworks, financial support, and technical capacity building, it could play a crucial role in the country's transition to renewable energy and its efforts to electrify remote rural areas.

## Reference

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