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HIGH POTENTIAL,
LOW PROSPERITY

STRUCTURAL AND REGULATORY GAPS IN RURAL RENEWABLE ENERGY TRANSITION

2026



HIGH POTENTIAL,
LOW PROSPERITY

STRUCTURAL AND REGULATORY GAPS IN RURAL RENEWABLE ENERGY TRANSITION

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

















SHARED PROSPERITY IN RENEWABLE ENERGY:
WHERE WE STAND TODAY

45

A CALL FOR PROGRESSIVE GOVERNMENT ACTION

KEY FINDINGS

Components	Key Indicators	2021	2024	Gap (%)	Findings & Policy Implication
01 NATIONAL OVERVIEW	Households without electricity	 991K	 658K	 -33.6%	Despite a 33.6 percent decline, PLN electrification still leaves around 658,000 households without electricity, concentrated in Eastern Indonesia (Papua, Maluku, and East Nusa Tenggara), highlighting persistent energy poverty and inequality.
	Solar-powered street lighting	 24,766	 30,476	 +23.1%	Solar street lighting shows the strongest growth (+23.1 percent), but remains limited to basic infrastructure, indicating that renewable energy adoption has yet to significantly reduce energy access gaps.
	Water pollution	 10,683	 11,019	 +3.1%	Village-level water pollution has increased by 3.1 percent, reflecting an environmental anomaly that appears to be closely linked to the expansion of extractive mining activities in rural regions.
	Non-grid households	 1.52 million	 1.17 million	 -23.0%	Around 1.17 million households still rely on non-PLN electricity sources, reflecting a high dependence on costly and polluting diesel generators in rural areas.
	Solar-powered households	 4,176	 3,076	 -26.3%	Household solar adoption has declined sharply (-26.3%) from an already low base, indicating significant barriers to entry, particularly due to high upfront installation costs and limited financing support.
	Biogas users	 749	 601	 -19.8%	Household biogas use shows a declining trend (-19.8 percent), reflecting limited policy support, insufficient subsidies for digesters, and a shift back to subsidized LPG.
	Micro-hydropower plants	 4,565	 4,102	 -10.1%	The utilization of rural water resources for micro-hydro has declined by 10.1 percent, with signs of functional deterioration, indicating the need for stronger community-based maintenance schemes to prevent infrastructure from falling into disuse.
	Energy credit schemes	 1,862	 1,643	 -11.8%	Access by rural institutions to green energy credit has declined by 11.8 percent, revealing a disconnect between sustainable banking products and the practical needs at the village level.
	Air pollution	 5,644	 4,754	 -15.8%	Reports of air pollution in rural areas have declined by 15.8 percent. However, the impact remains widespread, affecting 4,754 villages and driven by mining combustion sites, coal-fired power plants, and deforestation.
	Villages mining activities	 16,334	 15,927	 -2.5%	More than 15,000 village entities currently operate under extractive industry regimes (mining), placing substantial socio-ecological pressures that outweigh their potential for energy autonomy.

Components	Key Indicators	2021	2024	Gap (%)	Findings & Policy Implication
02 MINING VILLAGES & RENEWABLE ENERGY	Active mining villages	 16,334	 15,927	 -2.5%	More than 15,900 villages fall into the category of mining-affected villages. The presence of fossil fuel industries in these areas shows an asymmetric causal relationship with the slow adoption of clean energy transitions.
	Solar-powered street lighting	 24,766	 30,476	 +23.1%	The adoption of basic infrastructure such as solar-powered street lighting is 40-60 percent lower in mining-affected villages compared to climate-resilient villages.
	Solar-powered households	 4,176	 3,076	 -26.3%	Household-led rooftop solar-powered adoption remains extremely low and stagnant in regions exposed to mining-based economies.
	Biogas users	 749	 601	 -19.8%	A deceleration in the energy transition is evident, with mining-adjacent areas recording a steeper decline in circular energy adoption (biogas) than the national average.
	Micro-hydropower plants	 4,565	 4,102	 -10.1%	Villages within coal extraction zones exhibit alarmingly low levels of micro-hydropower utilization.
	Water pollution	 10,683	 11,019	 +3.1%	Mining activities have triggered a sharp deterioration in the quality and availability of community water sources, further eroding access to potential hydropower resources.
	Air pollution	 5,644	 4,754	 -15.8%	The combination of active mining operation and mine-mouth coal power plants has placed thousands of villages in a persistent of elevated air quality vulnerability.
03 RENEWABLE ENERGY POTENTIAL GAP	Gap in hydropower utilization	Potential 120.5K	Realization 1,039	0.9%	A massive opportunity cost arises as less than 5 percent of river flow potential across more than 120,000 sites remains unutilized as a backbone for village-level energy independence.
	Solar-powered street lighting trend	 24,766	 30,476	 +23.1%	Solar-powered street lighting funded by village budgets has grown by 23.1 percent, demonstrating the strong urgency for decentralized, off grid energy solutions to expand public access.
	Solar-powered households trend	 4,176	 3,076	 -26.3%	Rooftop solar is falling fast (-26.3 percent), held back by weak net metering and the lack of affordable financing for lower- and middle-income households
	Biogas trend	 749	 601	 -19.8%	Biogas use is down 19.8 percent, urgent incentives and upfront support for farmer-led communal digesters are needed now.
	Micro-hydropower trend	 4,565	 4,102	 -10.1%	Micro-hydropower is stalling (-10.1 percent), held back by power purchase rules that do not work for communities.
	Households without electricity trend	 991K	 658K	 -33.6%	The share of unelectrified households has dropped sharply (-33.6 percent in three years), yet millions in remote islands, mountainous regions, and forest villages will still wait another decade for reliable power if grid expansion remains the only strategy.

04

ENERGY VULNERABILITY INDEX

Most vulnerable



75.1
Central Papua

Five provinces face the highest energy vulnerability, largely concentrated in Eastern Indonesia, including Central Papua, Highland Papua, Papua, South Papua, and North Maluku. This condition calls for stronger, targeted fiscal support.

AVG

40.5

38 Provinces


Least vulnerable



15.2
Special Capital Region of Jakarta

Electricity infrastructure is heavily centralized in the Java-Bali megaregion, particularly in Jakarta, making these areas the most secure and least vulnerable to extreme energy insecurity.



 CELIOS Documentation, 2025

WHY THIS STUDY MATTERS

01

As global temperatures continue to rise due to escalating greenhouse gas emissions, the shift away from dirty, fossil fuel-based energy toward renewable energy (RE) is no longer optional, it is imperative. The current climate crisis is understood to be the result of decades of large-scale fossil fuel exploitation, whose environmental and social externalities have undermined the goal of achieving broad-based public prosperity.

Fossil resources are inherently tied to extractive practices that degrade the environment. A report by the Center of Economic and Law Studies (CELIOS) highlights that the poor management of extractive industries contributed to disasters in Sumatra in late 2025, which resulted in losses of up to IDR 68.67 trillion. This is a scale of loss far beyond what affected communities will ever receive from the extraction of non-renewable resources by corporations operating in their regions. Such environmentally destructive extractive activities are therefore fundamentally incompatible with the realization of public prosperity. For this reason, the transition to RE is not an alternative, it is the most viable path forward.

In Indonesia, this transition has been formally recognized through national commitments, including the 2022 Nationally Determined Contributions (NDC). Under this framework, the government has pledged to reduce emissions by 31.89 percent through domestic efforts and up to 43.20 percent with international support by 2030. These commitments are expected not only to curb emissions but also to catalyze investment in RE, paving the way for a more equitable and sustainable energy future.

Four years on from the 2022 NDC, we need to take a closer look at how the energy transition is unfolding on the ground. More importantly, we need to examine whether the economic benefits of RE are truly reaching communities—specially in rural areas—and improving people’s well-being. This study is designed to address these concerns. This inquiry is essential in light of Article 33(3) of the 1945 Constitution of the Republic of Indonesia, which mandates that, “The earth, water, and natural resources contained therein shall be controlled by the State and utilized for the greatest prosperity of the people.” This is not just a provision, it is the highest legal mandate that must be fulfilled.

RESEARCH METHODOLOGY

02

RESEARCH DESIGN & OBJECTIVES

This study employs a quantitative comparative design to evaluate renewable energy (RE) infrastructure adoption across Indonesian villages using two waves of the Potensi Desa (PODES) census BPS 2021 (84,096 villages) and 2024 (84,276 villages) capturing the velocity and spatial distribution of the energy transition at the grassroots level. Three objectives drive the analysis: (1) measure RE infrastructure adoption; (2) identify disparities between mining-dependent and non-mining villages; and (3) construct a composite Energy Vulnerability Index (IKE) ranking provincial energy resilience.

DATA SOURCE & SCOPE

Data derive exclusively from the PODES Village Potential Census (BPS), covering all 38 provinces of Indonesia including newly established Papua regions. The marginal increase in units from 2021 to 2024 reflects administrative fission (pemekaran wilayah) and does not introduce sampling bias. Ten PODES variables operationalize RE transition dimensions solar energy (public & household), bioenergy, hydropower, policy programs, infrastructure, natural assets, access deficits, and environmental degradation cross-tabulated against a binary Mining Village Index (R403a / R518).

VARIABLE OPERATIONALIZATION

- 1 Solar Energy – Public Lighting (PJU)
- 2 Solar Energy – Household
- 3 Bioenergy (Biogas)
- 4 Hydropower (Micro-hydro)
- 5 RE Policy & Programs
- 6 Energy Infrastructure
- 7 Natural Energy Assets
- 8 Energy Access (Non-PLN)
- 9 Energy Access (No Electricity)
- 10 Environmental Degradation

ANALYTICAL FRAMEWORK

1 Temporal Rate of Change

Longitudinal comparison between the 2021 and 2024 survey waves is expressed as a percentage rate of change, applied to all 10 dimensions at national and provincial levels. Villages are classified as improving (>+5%), stagnant (-5% to +5%), or declining (<-5%).

$$\Delta V (\%) = ((V_{2024} - V_{2021}) / V_{2021}) \times 100$$

2 Cross-Tabulation & Hypothesis Testing

A Chi-Square Test of Independence is applied to each of the 10 dimensions individually (significance threshold: $p < 0.05$), supplemented by likelihood ratio statistics and odds ratios to quantify the direction and magnitude of mining-village associations.

$$\chi^2 = \sum ((O - E)^2 / E)$$

3 Energy Vulnerability Index (IKE)

A composite index is constructed via Min-Max normalization across five sub-indicators (households without electricity, non-PLN households, villages without RE programs, villages without energy infrastructure, villages with water pollution), each weighted equally at 20%. IKE scores range from 0 (least) to 100 (most vulnerable).

$$IKE = \sum w_i \times (X_i - X_{i_min}) / (X_{i_max} - X_{i_min}), w_i = 0.20$$

4 Gap & Efficiency Analysis

Untapped potential is quantified via a gap ratio, contrasting resource endowment against realization (e.g., villages with water sources: 120,546 vs. micro-hydro users: 1,039; national gap: 99.14%). Efficiency scatter plots use a symlog scale with national threshold overlays.

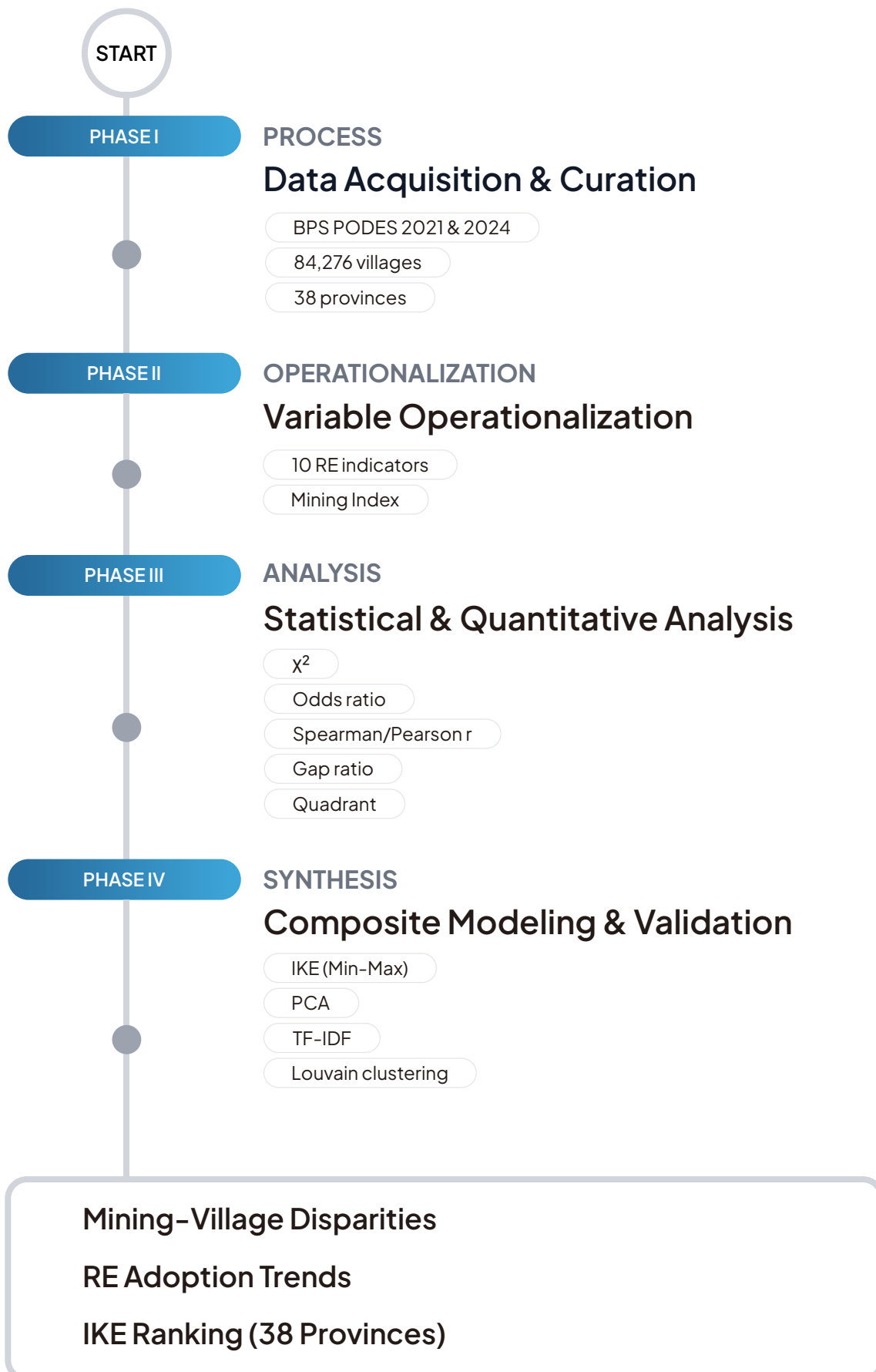
5 Correlation & Regression Diagnostics

Spearman rank correlation ($n = 38$) is used for ordinal pairs across the 10 dimensions; Pearson correlation addresses mining-externality relationships. Quadrant analysis classifies provinces into *absorbed*, *organic*, *inefficient*, or *stagnant* based on RE program input versus growth output.

6 Validation

The equal-weight IKE is benchmarked against a PCA single-component composite (PC1 rescaled 0-100) via Spearman correlation. Method legitimacy is confirmed through TF-IDF cosine similarity against academic abstracts and a Louvain-clustered keyword co-occurrence network from rural energy literature.

RESEARCH DESIGN



TURNING ENERGY INTO PUBLIC WELFARE

03

(Constitutional foundation)

The 1945 Constitution

(General regulations)

People's Consultative Assembly of the Republic of Indonesia No. IX/MPR/2001 on Agrarian Reform and Natural Resources Management
Law No. 5 of 1960 on Basic Agrarian Law
Law No. 30 of 2007 on Energy Law
Law No. 30 of 2009 on Electricity
Law No. 32 of 2009 on Protection and Management of Environment
Law No. 21 of 2014 on Geothermal Energy
Law No. 16 of 2025 on State-Owned Enterprise

An examination of the various regulations constituting the legal framework for renewable energy governance in Indonesia demonstrates that the regulatory framework is hierarchically structured. The framework consists of four levels, including the constitutional foundation level, the general regulatory level, the operational regulatory level, and the technical regulatory level. This hierarchy carries clear legal implications, as norms positioned at lower levels must not conflict with those established at higher levels.

(Derivative regulations)

Government Regulation No. 25 of 2021 on the Implementation of the Energy and Mineral Resource Sector
Government Regulation No. 10 of 2025 on Organization and Governance of the Daya Anagata Nusantara Investment Management Agency
Government Regulation No. 40 of 2025 on National Energy Policy (KEN)
Presidential Regulation No. 22 of 2017 on the National Energy General Plan (RUEN)
Presidential Regulation No. 112 of 2022 on the Acceleration of Renewable Energy Development for Electricity Supply

(Technical regulations)

Ministry of Environment and Forestry Regulation No. 4 of 2021 on the List of Businesses and/or Activities Required to Have an Environmental Impact Assessment, Environmental Management and Monitoring Efforts, or a Statement of Commitment to Environmental Management and Monitoring
Ministry of Energy and Mineral Resources Regulation No. 2 of 2024 on Rooftop Solar Power Plants Connected to the Electricity Grid of Holders of Electricity Supply Business Licenses for Public Interest
Ministry of Energy and Mineral Resources Regulation No. 10 of 2025 on the Roadmap for Energy Transition in the Electricity Sector
Several Regional Regulations governing the Regional Energy General Plan (RUED)
Ministry of Energy and Mineral Resources Regulation No. 20 of 2025 on the Strategic Plan of the Ministry of Energy and Mineral Resources for 2025–2029
Ministry of Finance Regulation No. 5 of 2025 on Procedures for the Granting and Implementation of Government Guarantees and Risk Assumption in the Context of Accelerating Renewable Energy Development for Electricity Supply

TURNING ENERGY INTO PUBLIC WELFARE

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Ministry of Energy and Mineral Resources Regulation No. 10 of 2025 on the Roadmap for Energy Transition in the Electricity Sector

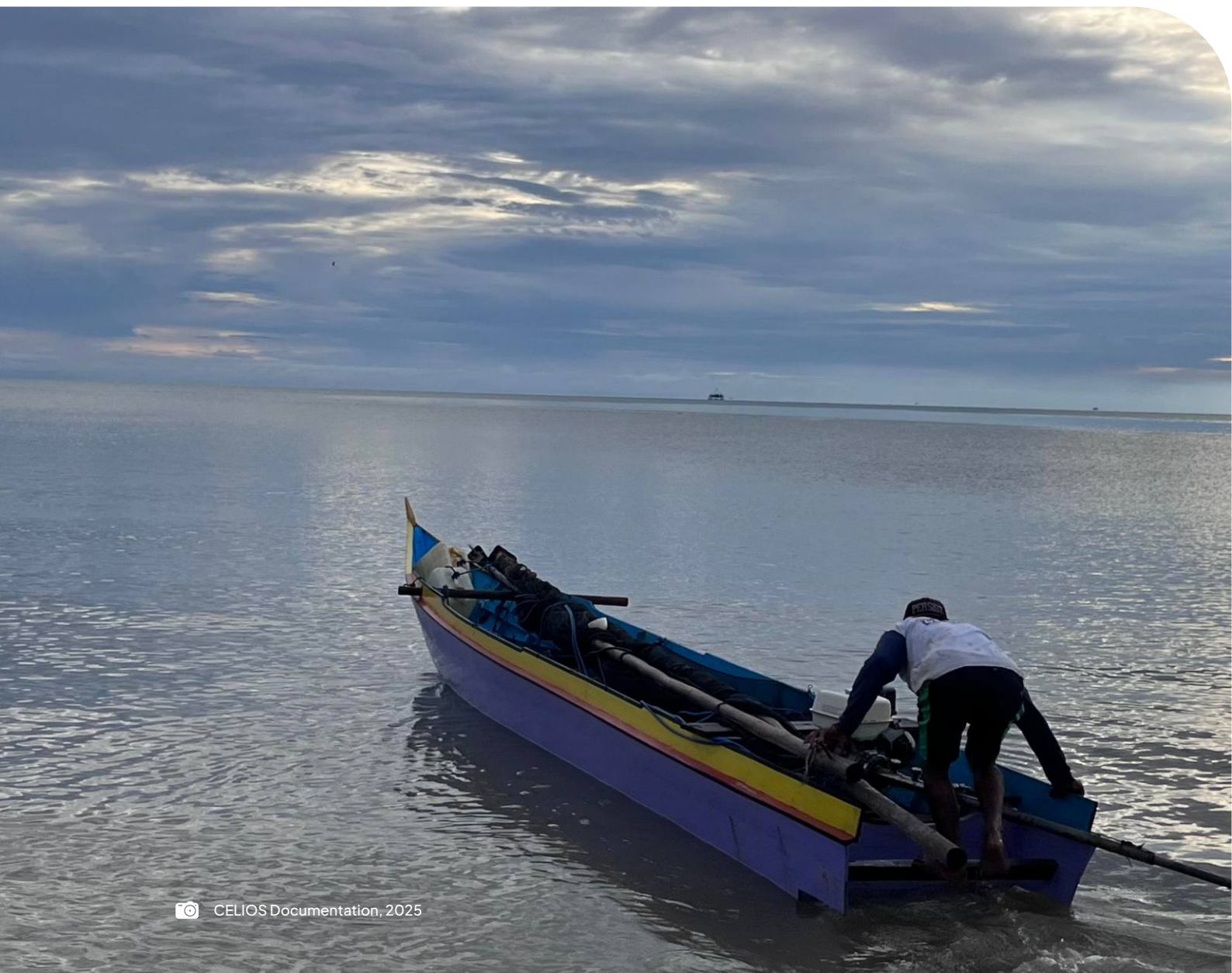
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Ministry of Finance Regulation No. 5 of 2025 on Procedures for the Granting and Implementation of Government Guarantees and Risk Assumption in the Context of Accelerating Renewable Energy Development for Electricity Supply

Article 33 of the 1945 Constitution mandates that natural resources throughout the territory of Indonesia, including the energy derived from them, be utilized for the greatest possible prosperity of the people. The utilization of these energy resources is required to take environmental sustainability into account. This norm should be understood as a fundamental basis for the formulation of the other legal norms governing the renewable energy sector in Indonesia.

Under the existing legal framework, renewable energy is positioned as an important component of the energy transition agenda. However, all of these regulatory frameworks are specifically oriented toward directing the development of renewable energy to the electricity sector. Even energy policy as a whole, not limited to renewable energy, is constructed as pertaining to the electricity sector. In addition, several extractive energy sources, such as geothermal energy and coal gasification-based energy, are classified as renewable energy under the currently applicable regulations.



 CELIOS Documentation, 2025

WHO NEEDS TO TAKE RESPONSIBILITY

04

From the various legal frameworks currently governing renewable energy projects, the state actors involved at the ministerial and state institutional bodies (Kementerian dan Kelembagaan) levels in Indonesia can at least be identified and mapped. The following is a list of ministers or heads of agencies who are vested with responsibility and authority in the renewable energy sector.



Ministry of Energy and Mineral Resources

Geothermal authority



Ministry of Forestry

Forest Permit



Ministry of Environment

Environmental Permit



Ministry of Agrarian and Spatial Planning/ National Land Agency

Land Rights



Ministry of Finance

Financial Guarantee



Daya Anagata Nusantara Investment Management Agency (DANANTARA)

The management of dividends, the approval of capital increases or reductions, and the lending of assets are conducted in ways that directly affect PLN and its subsidiary companies.



The National Electricity Company (PLN)

Electricity licensing



Regional Government






RUED & Local Control

THE IDEA OF SHARED PROSPERITY IN RENEWABLE ENERGY: AN INDONESIAN CONTEXTUAL REVIEW

In the context of renewable energy utilization, the concept of shared prosperity emphasizes that the transition to renewable energy must not be focused exclusively on carbon emission reduction, but must also ensure social justice, the protection of human rights, and the equitable distribution of benefits to affected communities, particularly Indigenous Peoples and local communities. This idea has been extensively discussed and developed by independent non-governmental institutions, such as the Business & Human Rights Resource Centre.

Renewable energy projects, furthermore, are required to respect human rights, especially those of Indigenous Peoples and frontline communities. The right to Free, Prior, and Informed Consent (FPIC) must not be reduced to an administrative formality, but must be recognized as a fundamental and ongoing requirement. Under this understanding, shared prosperity is understood as a condition in which affected communities are not limited to receiving compensation but instead are ensured participation in determining the direction of development, obtain direct economic benefits, secure meaningful roles in decision-making processes, and are provided with ownership or co-ownership of energy projects.

Technically, what must be underscored is that communities are not to be positioned as passive recipients, but rather as subjects of development who ought to be actively involved. In recognition of this, benefit sharing models may include, at a minimum:

				
Project revenue sharing	Community development initiatives	Equitable energy access and affordable electricity tariffs	Co-ownership or full ownership through equity stake in the projects	Alternative schemes determined by the community itself

At first glance, this approach to benefit sharing appears comparable to the types of compensation provided under Law No. 2 of 2012 on Land Acquisition for Public Interest Development, as partially amended by Law No. 6 of 2023 on Job Creation. These regulations likewise provide for various forms of compensation in the context of land affected by development, including money, replacement land, resettlement, share ownership, or other forms agreed upon between the parties.

However, the core idea of shared prosperity articulated in this paper is clearly distinct from the meaning reflected in Law No. 2 of 2012. Under the land acquisition regime, citizens and their land are positioned as objects of development, whereas the approach proposed here requires that communities—particularly Indigenous Peoples and frontline communities—be positioned as key actors in the development and utilization of renewable energy.

This interpretation is aligned with the constitutional mandate concerning the state controlled rights (*Hak Menguasai Negara*) over energy resources throughout the territory of the Republic of Indonesia, as provided in Article 33 of the 1945 Constitution. Article 33 paragraph (3) and (4) of the 1945 Constitution further governs that natural resources are to be managed for the greatest prosperity of the people and for the preservation of a sustainable environmental ecosystem. The 1945 Constitution has thus established a firm foundation regarding the direction that shared prosperity ought to take, namely to promote public welfare and protect the environment.

This mandate must be implemented actively by the State through:

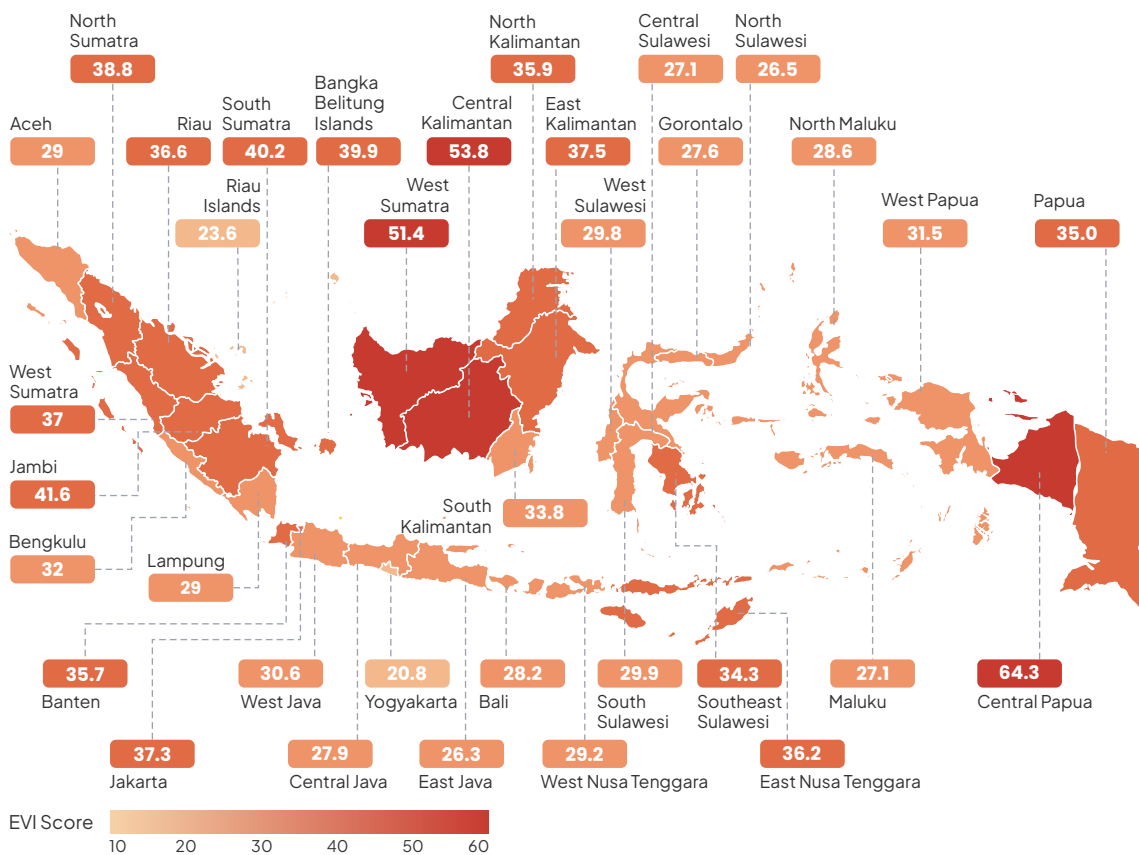
 The establishment of a just legal framework	 The correction of power imbalances between the corporations and communities
 The provision of legal, technical, and financial support to affected communities	 The formal recognition and protection of the legal status of Indigenous Peoples' rights

On the other hand, renewable energy companies must be positioned as key actors in ensuring a just and inclusive energy transition. One approach that may be adopted is the transformation of corporate engagement with communities from “extractive models” to “partnership-based models.” Shared prosperity, therefore, should not be regarded as an additional cost but as a necessary condition for the success and sustainability of “green energy” projects. Under this framework,

a substantively just energy transition does not replace energy sources but also transforms power relations, ownership structures, and the distribution of benefits.

INDONESIA'S RENEWABLE ENERGY SECTOR: A PORTRAIT IN RURAL AREAS ENERGY VULNERABILITY INDEX (INDEKS KERENTANAN ENERGI)

Figure. Energy Vulnerability Index Map



The Energy Vulnerability Index or EVI is constructed using an equal weighting approach, where all indicators are assigned the same weight. Each indicator is normalized to a 0-1 scale using min-max scaling, then averaged and multiplied by 100 to produce the final score. As a robustness check, the results are compared with a Principal Component Analysis (PCA) approach, showing a very strong correlation (>0.9), indicating that equal weighting method is sufficiently robust.

Energy access is often understood simply as whether electricity is available. In reality, energy vulnerability is far more complex, encompassing program availability, infrastructure readiness, socio-economic conditions, and environmental pressures. To capture this multidimensional reality the EVI is developed to assess energy risks at the provincial level.

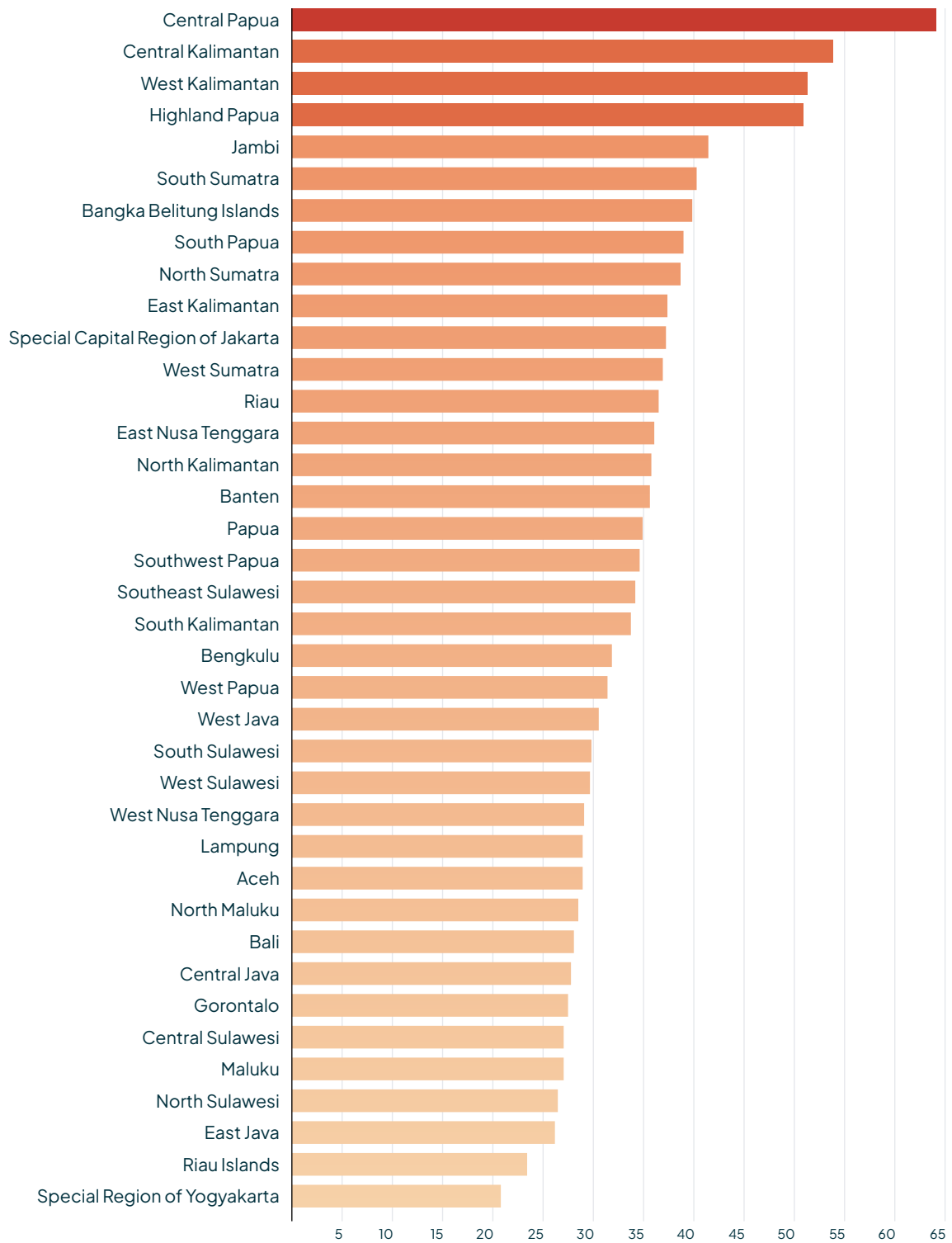
The EVI is built on seven key indicators:

Percentage of households without electricity access	01
Dependence on non-grid electricity sources	02
Villages without RE programs	03
Villages without energy infrastructure	04
Villages with slum settlements	05
Villages without adequate sanitation facilities	06
Villages exposed to water, soil, and air pollution	07

**All indicators follow the same principle,
higher values indicate higher vulnerability**

The results show that EVI scores across provinces range from 20.8 (least vulnerable) to 64.3 (most vulnerable), with a national average of 34.7 ± 8.8 . Most provinces fall within a moderate range, but several high-scoring outliers are concentrated in Eastern Indonesia. The gap between the most and the least vulnerable provinces reaches 43.4 points, highlighting the energy inequality in Indonesia remains wide and structurally entrenched.

Figure. Provincial Vulnerability Ranking

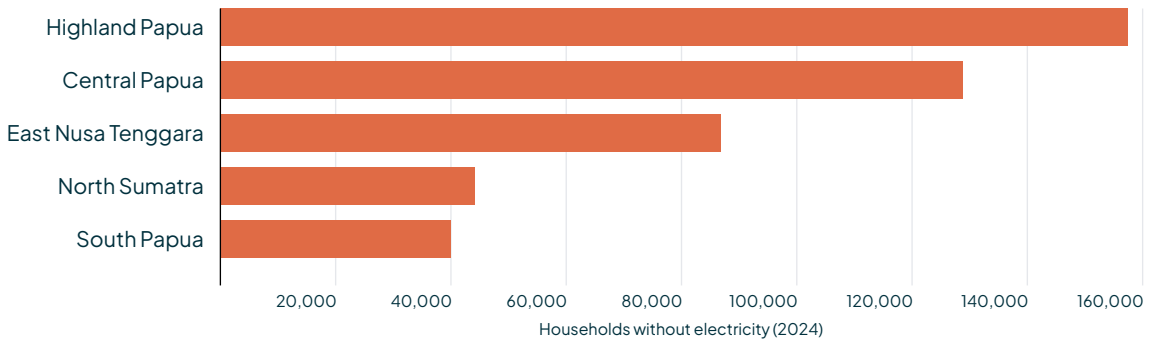


The ranking of 38 provinces on EVI scores, from most to least vulnerable, shows a clear distribution pattern. Using a threshold of ± 1 standard deviation (8.8) from the national average (34.7), four provinces fall into the high-risk category (EVI > 43.5), 32 provinces are in the moderate range, and only two provinces are classified as low-risk (EVI < 25.9).

The distribution is right-skewed, indicating that while most provinces exhibit moderate to low levels of vulnerability, a small number of provinces record exceptionally high scores and emerge as outliers, particularly in Eastern Indonesia.

The gap between the highest and lowest scoring provinces reaches 43.4 points. The wide disparity highlights that energy vulnerability across regions remains highly unequal and unevenly distributed.

Figure. Provinces with the highest energy vulnerability

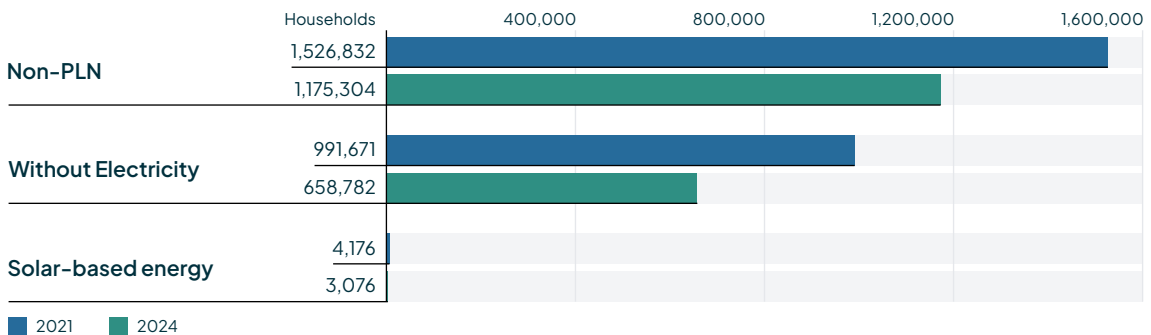


Source: PODES data 2021 and 2024 processed by CELIOS. Showing the 5 (five) provinces with the highest number of households without electricity (2024).

At least, 658,782 households still lack access to electricity. Highland Papua (157,563 households) and Central Papua (129,220 households) account for nearly 44 percent of the national total, underscoring a clear disparity in access. Provinces such as Highland Papua, Central Kalimantan, and East Nusa Tenggara also show high levels of solar adoption, driven not by innovation but by the lack of viable alternatives to off-grid electricity systems, an indication of energy poverty.

Infrastructure and Renewable Energy Adoption

Figure. Household-level adoption of renewable energy

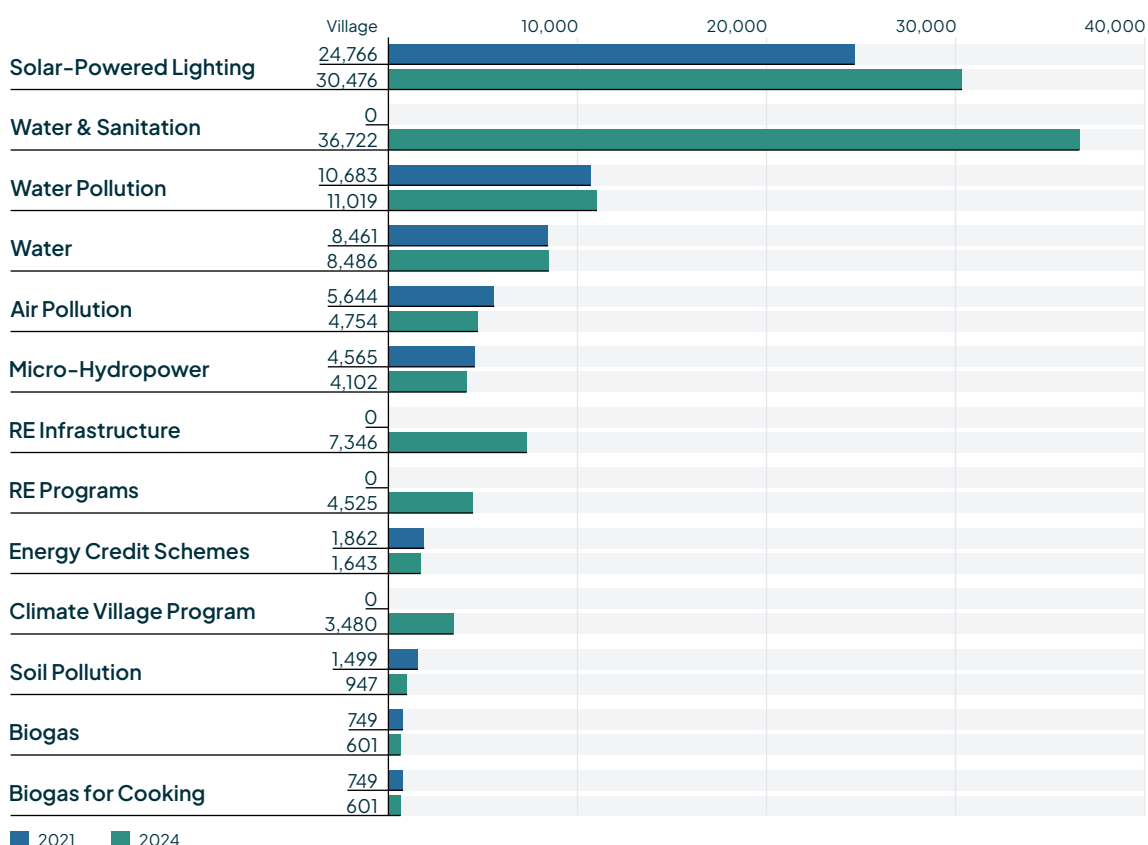


Source: PODES¹ Data 2021 and 2024 processed by CELIOS. The analysis compares the absolute number of households for each RE dimension between 2021 and 2024. The data are disaggregated from the village level to the national level using the SUM aggregation method for each dimension.

¹ PODES (Village Potential Statistics) is a dataset produced by Badan Pusat Statistik (Statistics Indonesia), the Indonesian government's official statistics agency.

This figure shows how many households use RE from 2021 to 2024. The rise in non-PLN² electricity does not mean more people are using RE because most of it comes from generators and diesel power. The use of RE, especially solar-based energy, actually went down. Fewer villages now have households using solar energy, 3,076 villages compared to 4,176 before. This could mean there are problems related to maintenance and the long-term sustainability of RE systems.

Figure. Infrastructure and Renewable Energy Adoption at the Village Level



Source: PODES data 2021 and 2024 processed by CELIOS. This figure compares the number of villages with RE infrastructure and programs in 2021 and 2024. The data are calculated by aggregating the total number of villages at the national level and then grouping them according to each dimension.

The dimensions include the use of solar-powered street lighting; utilization and potential of water resources for electricity generation; the existence of RE development programs; the availability of energy infrastructure; spring water sources; and indicators of water and soil pollution.

This figure illustrates the state of RE infrastructure and programs at the village level in 2021 and 2024. The figures are drawn from national totals and grouped by dimension. The most notable progress is observed in solar-powered street lighting, where the number of villages increased by 23.1 percent, from 24,766 to 30,476. This is the only indicator showing consistent growth, reflected in the chart.

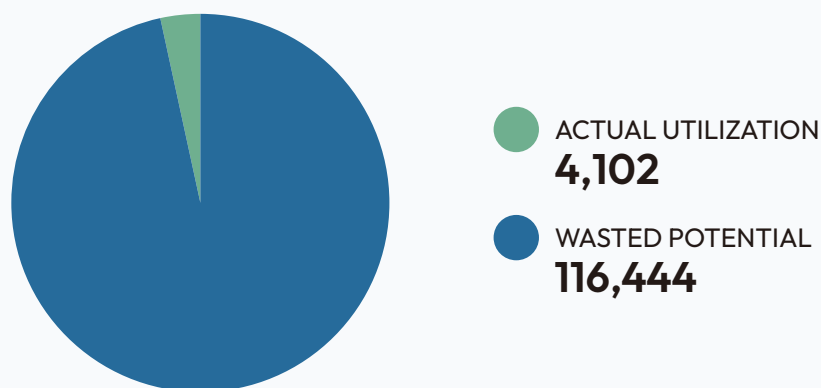
² Perusahaan Listrik Negara (PLN) is Indonesia's state-owned electricity company.

Beyond this, the overall trend remains negative. Biogas utilization has declined by 19.8 percent, from 749 to 601 villages. Out of a total of 84,276 villages in Indonesia, only 601 utilize biogas, with most concentrated in Java. This indicates both limited scale and uneven distribution.

The use of water resources for electricity generation also remains weak. Micro-hydropower has decreased by 10.1 percent, from 4,565 to 4,102 villages. This points not only to slow expansion but also to the possible decline or underutilization of existing infrastructure.

Most concerning is the status of RE programs. Coverage remains extremely limited, with 94.63 percent of villages having no RE development programs at all. Only 4,525 villages are recorded as having such initiatives. This picture highlights that RE development at the village or community level has yet to become a strategic priority.

Figure. The Underutilized Potential of Micro-Hydropower



Source: PODES data 2021 and 2024 processed by CELIOS. Hydropower resources and potential: River, Canals, Lakes, and Reservoirs.

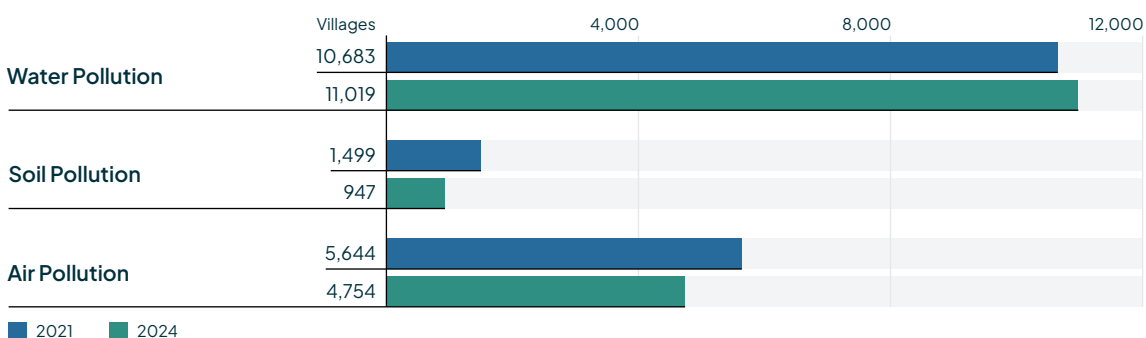
Utilization is calculated as actual output divided by total potential (x100%). The remainder indicates the share of unutilized energy potential.

Just 3.40 percent of hydropower potential is utilized, leaving 116,444 villages untapped.

Out of 120,546 villages with water resources—such as rivers, irrigation canals, lakes, and reservoirs—only 4,102 villages (3.40 percent) use them for electricity generation. As illustrated in the figure, this share is barely visible compared to the vast portion representing untapped potential. Even more concerning, utilization has declined by 10.1 percent, from 4,565 villages in 2021 to 4,102 in 2024.

Environmental challenges in rural areas can no longer be viewed from a single perspective. Pollution now occurs in multiple interconnected forms, affecting water, soil, and air, and directly impacts the quality of life of local communities. Expanding the scope of analysis is therefore essential to capture ecological pressures more comprehensively, while also tracing their potential links to economic activities in specific regions, including mining areas.

Figure. Number of Villages Affected by Pollution



Source: PODES data 2021 and 2024 processed by CELIOS. Number of villages affected by water, soil, and air pollution, 2021 and 2024.

The figure shows that water pollution remains the most prevalent, affecting 11,019 villages and increasing by 3.15 percent compared to the previous year. Air pollution is recorded in 4,754 villages, while soil pollution affects 947 villages. Compared to 2021, soil pollution has declined significantly from 1,499 to 947 villages (-36.8 percent), but water pollution has continued to rise. This finding is important in the context of the energy transition, especially with regard to the use of water resources for electricity generation. The increase in water pollution is occurring alongside the persistently low utilization of water resources for power generation.



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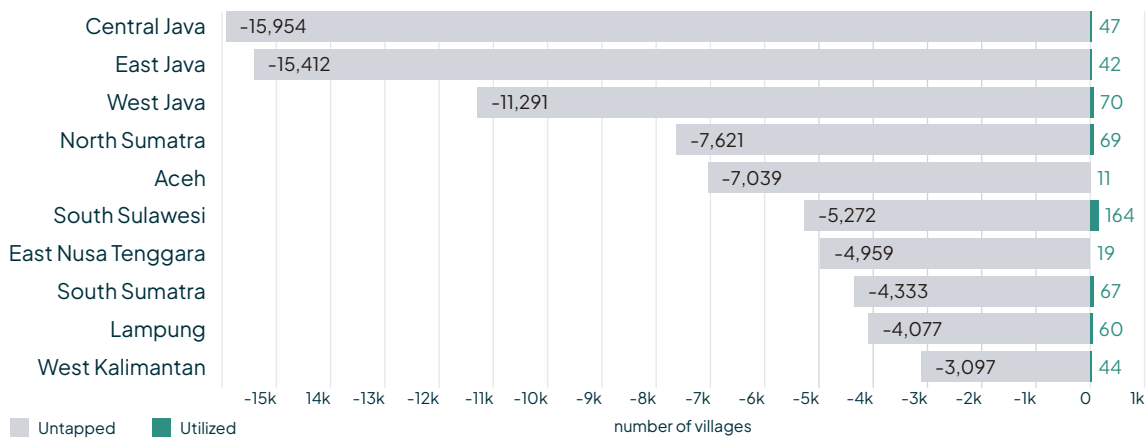
Potential and Realization Gap

1 Water Energy (Hydro)



The disparity in the utilization of hydropower is not only evident at the national level but becomes even more pronounced at the provincial level. In several regions, abundant water resources are not matched by the development of water-based power generation. This interprovincial comparison is essential to identify where the largest gaps occur and to assess the extent to which local potential is effectively utilized as an energy source.

Figure. Top 10 Provinces with the Largest Disparities



Source: PODES data 2021 and 2024 processed by CELIOS. This analysis uses a diverging bar chart to compare the potential and actual utilization of hydropower across 38 provinces in 2024. The gap is calculated as the difference between the number of villages with water resources (rivers, lakes, reservoirs, and irrigation canals) and the number of villages that have utilized these resources for hydropower, including large-scale hydropower, micro-hydropower, and pico-hydropower. The results are then ranked based on the largest gaps.

Out of 120,546 villages with hydropower potential, only 1,039 villages (0.86 percent) have utilized water resources for electricity generation through hydropower systems, including large-scale hydropower, micro-hydropower, and pico-hydropower. This means that approximately 99.14 percent of the available hydropower potential at the village level remains untapped.

This extremely wide utilization gap highlights a serious structural problem in Indonesia's renewable energy transition. Despite the widespread availability of water resources across rural areas, the conversion of this natural potential into productive energy infrastructure remains exceptionally limited. The fact that less than one percent of potential villages have operational hydropower facilities suggests that the challenge is not the absence of resources, but rather the presence of significant institutional, financial, technological, and regulatory barriers.

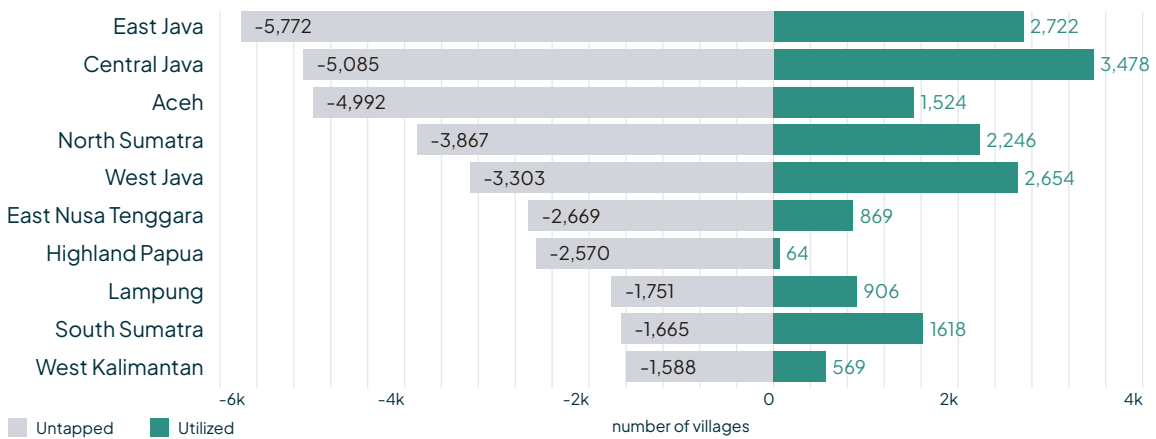
Figure. National Overview of Hydropower by Province

Province	Potential	Achieved	Ratio	Gap
1 Special Capital Region of Jakarta	233	0	0,00%	233
2 Maluku	797	0	0,00%	797
3 Riau Islands	242	0	0,00%	242
4 Bangka Belitung Islands	529	0	0,00%	529
5 North Maluku	1,007	0	0,00%	1,007
6 East Kalimantan	1,491	1	0,07%	1,490
7 Central Kalimantan	2,181	2	0,09%	2,179
8 Banten	2,644	3	0,11%	2,641
9 South Papua	709	1	0,14%	708
10 Aceh	7,050	11	0,16%	7,039
11 South Kalimantan	2,602	5	0,19%	2,597
12 Special Region of Yogyakarta	842	2	0,24%	840
13 West Papua	748	2	0,27%	746
14 East Java	15,454	42	0,27%	15,412
15 Central Java	16,001	47	0,29%	15,954
16 Gorontalo	944	3	0,32%	941
17 Highland Papua	2,154	7	0,32%	2,147
18 East Nusa Tenggara	4,978	19	0,38%	4,959
19 Bali	1,279	5	0,39%	1,274
20 West Nusa Tenggara	2,598	13	0,50%	2,585
21 North Sulawesi	2,081	11	0,53%	2,070
22 Riau	2,004	11	0,55%	1,993
23 West Java	11,361	70	0,62%	11,291
24 Papua	666	5	0,75%	661
25 Southeast Sulawesi	2,451	19	0,78%	2,432
26 Bengkulu	2,014	18	0,89%	1,996
27 North Sumatra	7,690	69	0,90%	7,621
28 Southwest Papua	797	8	1,00%	789
29 North Kalimantan	586	8	1,37%	578
30 West Kalimantan	3,141	44	1,40%	3,097
31 Lampung	4,137	60	1,45%	4,077
32 South Sumatra	4,400	67	1,52%	4,333
33 Central Sulawesi	2,517	49	1,95%	2,468
34 Central Papua	1,130	24	2,12%	1,106
35 West Sumatra	2,444	52	2,13%	2,392
36 Jambi	2,136	61	2,86%	2,075
37 South Sulawesi	5,436	164	3,02%	5,272
38 West Sulawesi	1,072	136	12,69%	936

2 Solar Energy



National figures indicate that more than one-third of villages have installed solar-powered street lighting. However, this aggregate does not fully reflect its distribution across regions. Behind the national average, there are notable differences among provinces.



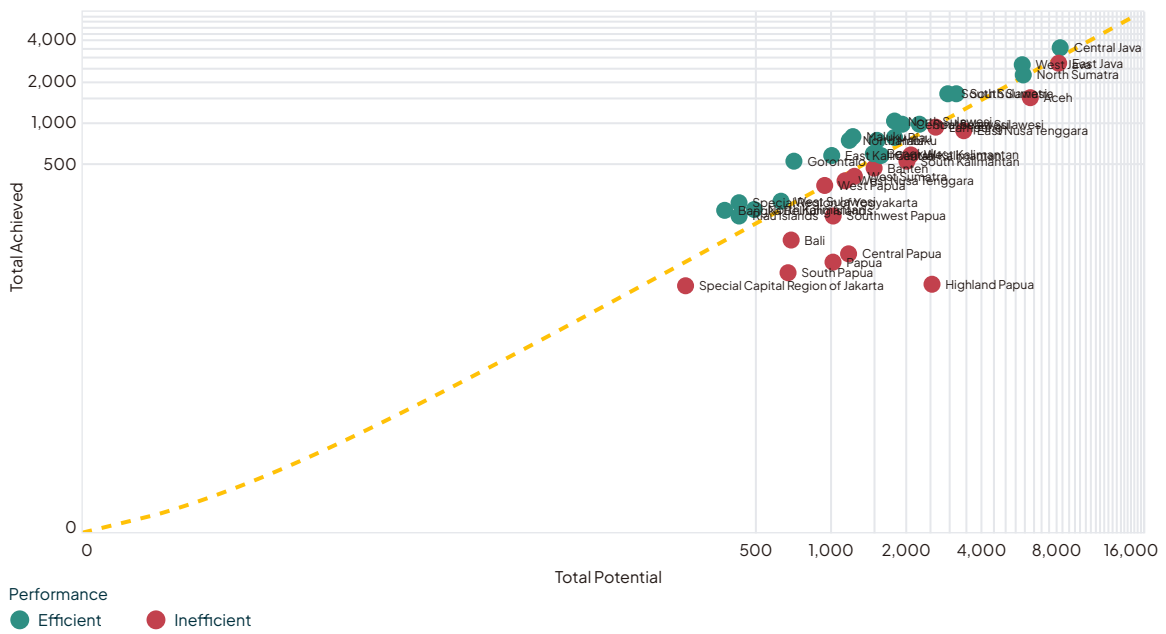
Source: PODES data 2021 and 2024 processed by CELIOS. This figure presents the use of solar-powered street lighting across 38 provinces in 2024 using a diverging bar chart (butterfly) approach. Potential is defined as the total number of villages in each province, while realization refers to the number of villages that have already adopted solar-powered street lighting. The gap is calculated using the formula: Gap = Potential - Realization or Achieved. The left bars (gray) represent villages that have not yet utilized the potential, while the right bars (colored) represent those that have. Provinces are ranked based on the size of the gap to highlight the highest levels of disparity.

In principle, all 84,276 villages in Indonesia have the potential to utilize solar energy. However, as of 2024, only 30,476 villages (36.16 percent) have installed solar-powered street lighting. This indicates that more than half of all villages have yet to adopt this relatively simple and easily deployable technology. East Java records the largest gap, with 5,772 villages still lacking solar-powered street lighting. This is particularly noteworthy given that solar-powered street lighting is modular, rapidly deployable, and does not rely on grid infrastructure. As such, it represents a practical and effective instrument for reducing disparities in energy access at the village level.

Figure. National Overview of Solar Energy Use by Province

Province	Potential	Achieved	Ratio	Gap
1 Highland Papua	2,634	64	2,43%	2,570
2 Central Papua	1,208	107	8,86%	1,101
3 Papua	1,029	94	9,14%	935
4 South Papua	690	79	11,45%	611
5 Bali	717	137	19,11%	580
6 Southwest Papua	1,056	204	19,32%	852
7 Aceh	6,516	1,524	23,39%	4,992
8 Special Capital Region of Jakarta	267	63	23,60%	204
9 East Nusa Tenggara	3,538	869	24,56%	2,669
10 South Kalimantan	2,015	523	25,96%	1,492
11 West Kalimantan	2,157	569	26,38%	1,588
12 Banten	1,552	460	29,64%	1,092
13 West Sumatra	1,286	398	30,95%	888
14 East Java	8,494	2,722	32,05%	5,772
15 West Nusa Tenggara	1,166	376	32,25%	790
16 Lampung	2,657	906	34,10%	1,751
17 West Papua	970	347	35,77%	623
18 Central Kalimantan	1,577	579	36,72%	998
19 North Sumatra	6,113	2,246	36,74%	3,867
20 Bengkulu	1,514	585	38,64%	929
21 West Sulawesi	650	259	39,85%	391
22 Central Java	8,563	3,478	40,62%	5,085
23 Riau	1,870	762	40,75%	1,108
24 Southeast Sulawesi	2,292	963	42,02%	1,329
25 West Java	5,957	2,654	44,55%	3,303
26 Jambi	1,585	730	46,06%	855
27 Riau Islands	430	204	47,44%	226
28 North Kalimantan	484	231	47,73%	253
29 Central Sulawesi	2,022	994	49,16%	1,028
30 South Sumatra	3,283	1,618	49,28%	1,665
31 South Sulawesi	3,060	1,621	52,97%	1,439
32 East Kalimantan	1,052	568	53,99%	484
33 North Sulawesi	1,838	1,032	56,15%	806
34 Bangka Belitung Islands	393	223	56,74%	170
35 Special Region of Yogyakarta	438	250	57,08%	188
36 North Maluku	1,209	735	60,79%	474
37 Maluku	1,262	780	61,81%	482
38 Gorontalo	732	522	71,31%	210

Figure. Regression Analysis of Utilization Efficiency



Source: PODES data 2021 and 2024 processed by CELIOS. This figure represents a scatter plot comparing the utilization of solar-powered street lighting across 38 provinces in 2024. Potential is defined as the total number of villages in each province, while realization refers to the number of villages that have installed solar-powered street lighting. Utilization efficiency is calculated using the formula: $\text{Efficiency} = (\text{realization/potential}) \times 100\%$. The dashed yellow line represents the national average of 36.16 percent and serves as a reference threshold. Provinces shown in green indicate efficiency levels at or above the national average, while those in red fall below it. The axes are displayed on a symmetric logarithmic scale (symlog) to enhance readability, given the substantial variation in the number of villages across provinces.

This figure illustrates the position of each province relative to the national average utilization of solar-powered street lighting, which stands at 36.16 percent. The horizontal axis represents total village potential, while the vertical axis shows total realized utilization of solar-powered street lighting. Both axes are presented on a symmetric logarithmic scale to accommodate wide variation in data across provinces. Without this adjustment, patterns of disparity and gaps in utilization would not be clearly or proportionally represented. Across 38 provinces, 17 fall below the national average (indicated by red markers/inefficient), while 21 are above it (indicated by green markers/efficient). Overall, a larger share of provinces lies above the national average.

Policy Change Trends

1 Water Energy (Hydro)

Figure. Shifting Patterns in Micro-Hydropower Utilization (2021 and 2024)



Trend Status Overview



Source: PODES data 2021 and 2024 processed by CELIOS. This analysis examines changes in the utilization of water-based energy (micro-hydropower) in 2021 and 2024, based on the indicator of the number of villages adopting such systems across 38 provinces. Growth is calculated using the formula: $((\text{Value 2024} - \text{Value 2021}) / \text{Value 2021}) \times 100$ percent. The results are then classified using a ± 5 percent threshold into three categories: improvement, decline, and stagnation. The analysis is descriptive and comparative, focusing on two points in time, and does not apply weighting based on the number of villages. As a result, extreme changes may be influenced by a small initial baseline.

The figure above illustrates the shift in the number of villages utilizing hydropower (micro-hydro) across 38 provinces in 2021 and 2024. Among the 38 provinces, significant increases (greater than +5 percent) were observed in 5 provinces (13 percent), significant declines (less than -5 percent) were recorded in 25 provinces (66 percent), and relative stagnation (ranging from -5 percent to +5 percent) was identified in 8 provinces (21 percent).

In aggregate, the predominance of provinces experiencing either decline or stagnation indicates that the growth of village-scale hydropower utilization during this period has tended to slow. This condition does not yet reflect an acceleration of the RE transition at the local or regional level.



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2 Solar Energy (Solar-Powered Households)

Figure. Shifting Patterns in Solar-Powered Households Utilization (2021 and 2024)



Trend Status Overview



Source: PODES data 2021 and 2024 processed by CELIOS. This analysis examines changes in the utilization of solar-powered households in 2021 and 2024, based on the indicator of the number of villages adopting such systems across 38 provinces. Growth is calculated using the formula: $((\text{Value 2024} - \text{Value 2021}) / \text{Value 2021}) \times 100$ percent. The results are then classified using a ± 5 percent threshold into three categories: improvement, decline, and stagnation. The analysis is descriptive and comparative, focusing on two points in time, and does not apply weighting based on the number of villages. As a result, extreme changes may be influenced by a small initial baseline.

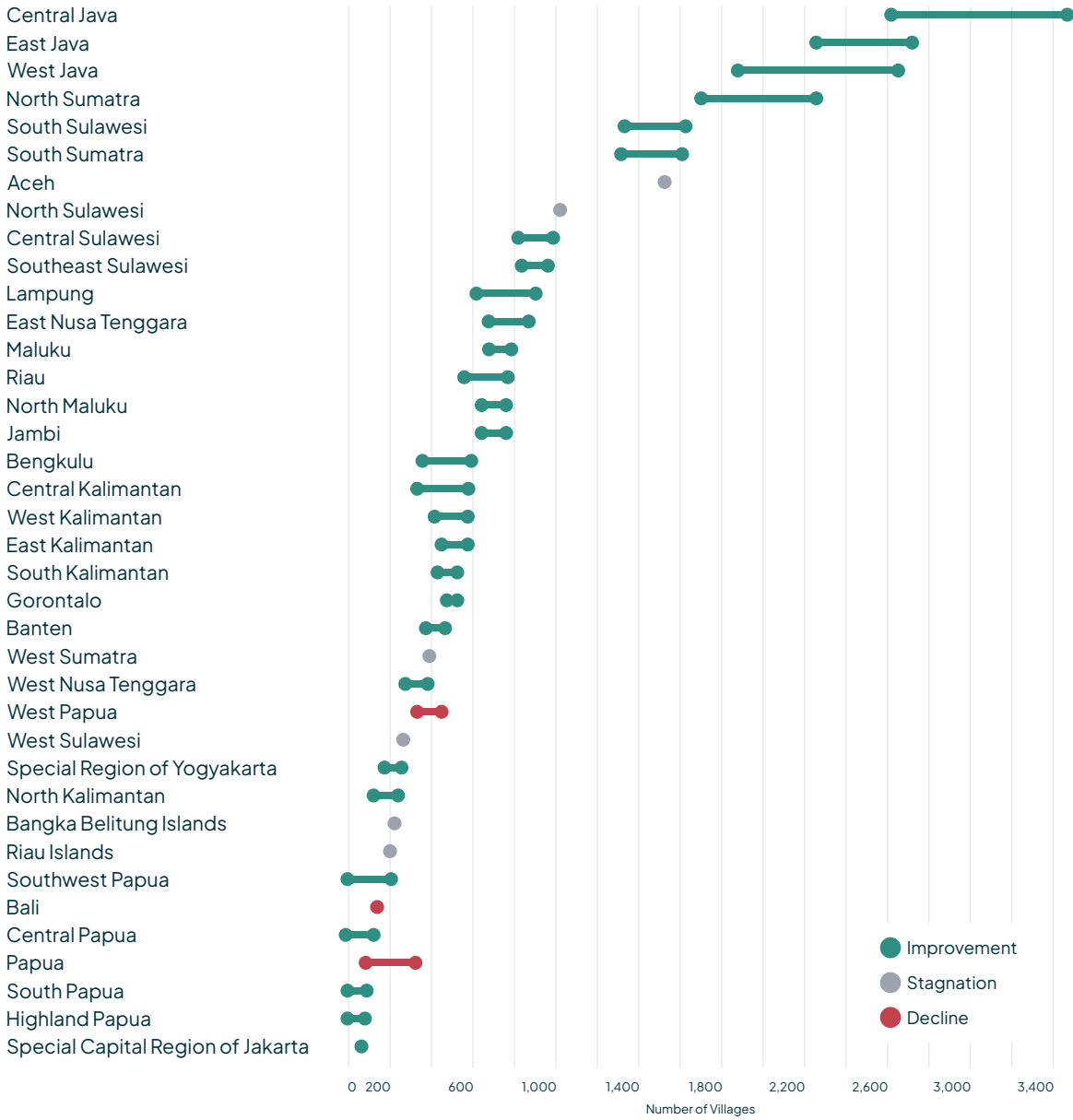
Across 38 provinces, improvements of more than 5 percent were observed in 7 provinces (18 percent), while significant declines exceeding 5 percent were recorded in 29 provinces (76 percent), and stagnation (changes within the range of -5 percent to +5 percent) was identified in 2 provinces (6 percent). Overall, this distribution indicates that the national trend in household-level solar energy utilization has tended to weaken, as the number of provinces experiencing decline or stagnation substantially exceeds those demonstrating growth. This suggests that the pace of the RE transition at the household level has not yet accelerated sufficiently, in many cases, has instead slowed.



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3 Solar-Powered Street Lighting

Figure. Shifting Pattern in Solar-Powered Street Lighting Utilization (2021 and 2024)




Trend Status Overview



Source: PODES data 2021 and 2024 processed by CELIOS. The indicator of the number of villages utilizing solar-powered street lighting was assessed across 38 provinces. Growth was calculated using the formula: $((\text{Value 2024} - \text{Value 2021}) / \text{Value 2021}) \times 100$ percent, and was subsequently classified using a ± 5 percent threshold (improvement, decline, or stagnation). The analysis was conducted in a descriptive-comparative manner over time without weighting by the number of villages, therefore extreme changes may have been influenced by a small initial baseline.

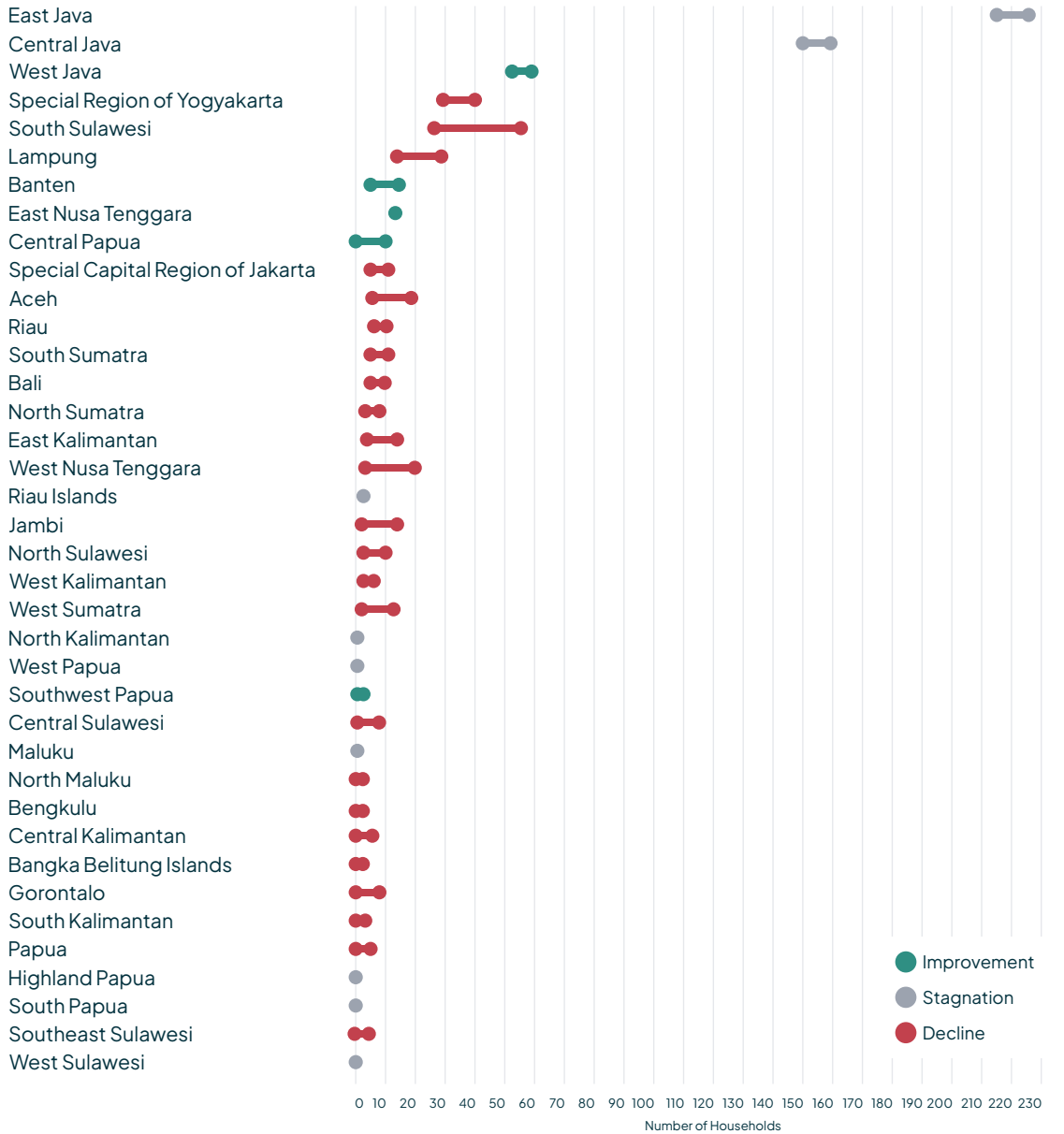
The figure above illustrates changes in the number of solar-powered street lighting across 38 provinces in 2021 and 2024. Significant increases (greater than + 5 percent) were observed in 29 provinces (76 percent), while significant declines (less than -5 percent) were recorded in 3 provinces (8 percent), and 6 provinces remained relatively stagnant. The highest increase was recorded in Southwest Papua (+100.0 percent), whereas the most substantial decline occurred in Papua (-69.7 percent). Overall, the trend is positive, as the majority of provinces experienced growth. However, it should be noted that when the initial baseline is small, a high percentage increase does not necessarily indicate a large absolute number of installed units.



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4 Biogas

Figure. Shifting Pattern in Biogas Utilization (2021 and 2024)



Trend Status Overview



Source: PODES data 2021 and 2024 processed by CELIOS. The indicator of the number of villages biogas was assessed across 38 provinces. Growth was calculated using the formula: $(\text{Value 2024} - \text{Value 2021}) / \text{Value 2021} \times 100$ percent, and was subsequently classified using a ± 5 percent threshold (improvement, decline, or stagnation). The analysis was conducted in a descriptive-comparative manner over time without weighting by the number of villages, therefore extreme changes may have been influenced by a small initial baseline.

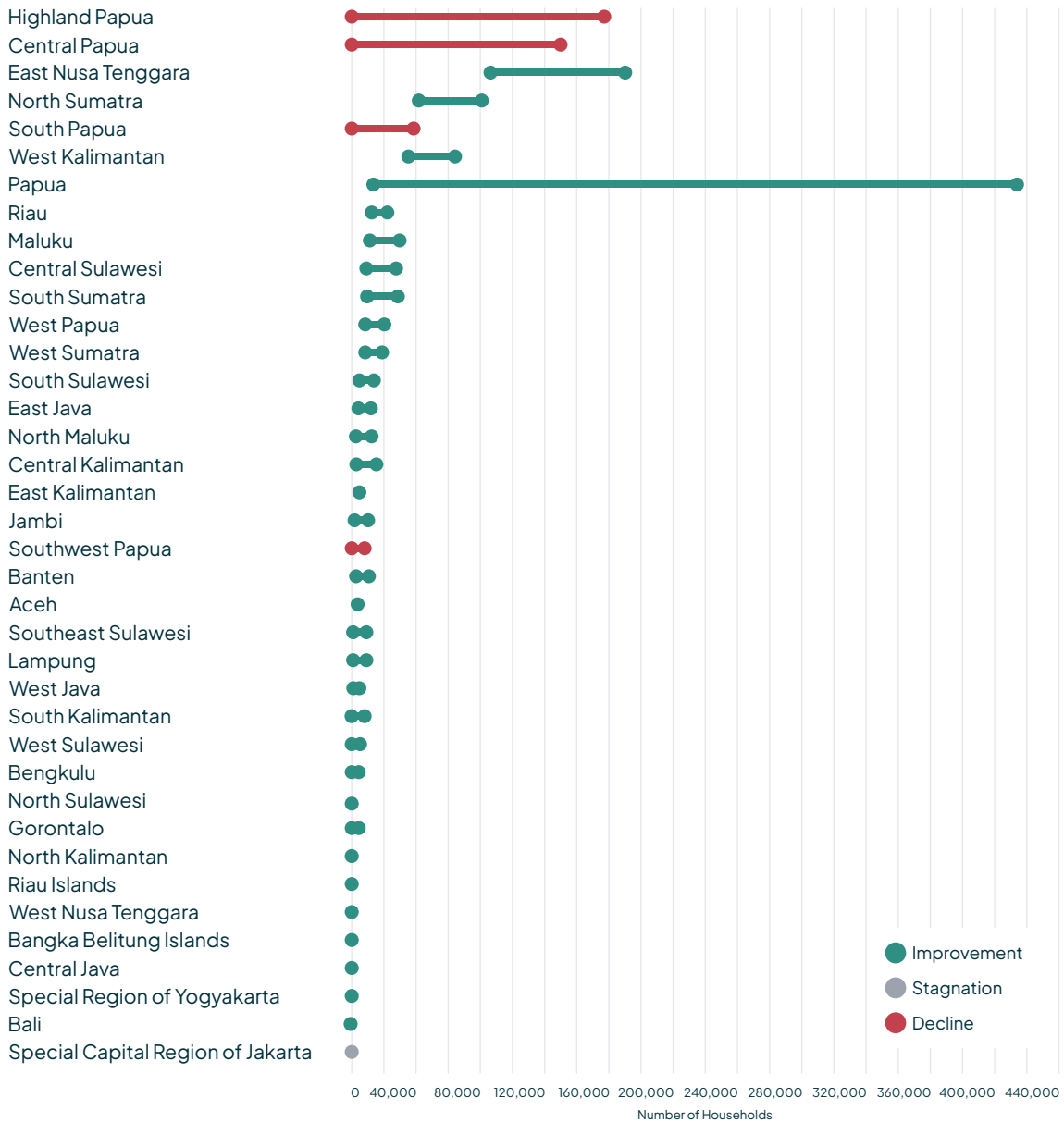
The figure above illustrates changes in the number of biogas users across 28 provinces in 2021 and 2024. Significant increases (greater than +5 percent) were observed in only 5 provinces (13 percent), while significant declines (less than -5 percent) were recorded in 24 provinces (63 percent), and 9 provinces remained relatively stagnant. Overall, a greater number of provinces experienced decline or stagnation than growth.



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5 Households without Electricity

Figure. Shifting Pattern in Households without Electricity (2021 and 2024)



Trend Status Overview



Source: PODES data 2021 and 2024 processed by CELIOS. The indicator of the number of villages without electricity was assessed across 38 provinces. Growth was calculated using the formula: $((\text{Value 2024} - \text{Value 2021}) / \text{Value 2021}) \times 100$ percent, and was subsequently classified using a ± 5 percent threshold (improvement, decline, or stagnation). The analysis was conducted in a descriptive-comparative manner over time without weighting by the number of villages, therefore extreme changes may have been influenced by a small initial baseline.

The figure above illustrates changes in the number of households without electricity across 38 provinces in 2021 and 2024. For this indicator, a decrease represents an improvement. Significant reductions (greater than 5 percent) were observed in 33 provinces (87 percent), while increases were recorded in 4 provinces (11 percent), and 1 province remained relatively stagnant. Overall, the trend is improving, as the majority of provinces succeeded in reducing the number of households without electricity. However, it remains important to assess whether these reductions are substantial in absolute terms or merely reflect small changes from a low initial baseline.



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6 Water Pollution

Figure. Shifting Pattern in Water Pollution (2021 and 2024)



Trend Status Overview



Source: PODES data 2021 and 2024 processed by CELIOS. The water pollution indicator was assessed across 38 provinces. Growth was calculated using the formula: $((\text{Value 2024} - \text{Value 2021}) / \text{Value 2021}) \times 100$ percent, and was subsequently classified using a ± 5 percent threshold (improvement, decline, or stagnation). The analysis was conducted in a descriptive-comparative manner over time without weighting by the number of villages, therefore extreme changes may have been influenced by a small initial baseline.

The figure above illustrates changes in water pollution levels across 38 provinces in 2020 and 2021. For this indicator, a decrease represents an improvement. Improvements were observed in 14 provinces (37 percent), while deterioration due to significant increases was recorded in 16 provinces (42 percent), and 8 provinces remained stagnant. Overall, a greater number of provinces experienced deterioration or no change than improvement. This indicates that efforts to address water pollution in many regions have not yet demonstrated consistent progress.



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7 Mining Villages

Figure. Shifting Pattern in Mining Villages (2021 and 2024)



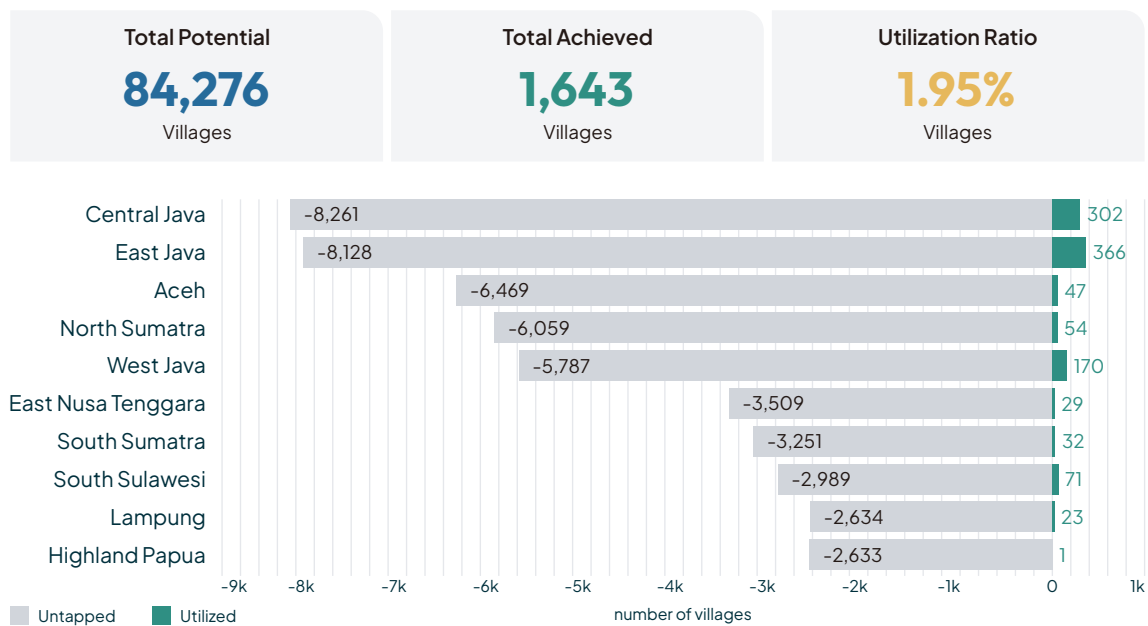
Trend Status Overview



Source: PODES data 2021 and 2024 processed by CELIOS. The indicator of mining villages was assessed across 38 provinces. Growth was calculated using the formula: $((\text{Value 2024} - \text{Value 2021}) / \text{Value 2021}) \times 100$ percent, and was subsequently classified using a ± 5 percent threshold (improvement, decline, or stagnation). The analysis was conducted in a descriptive-comparative manner over time without weighting by the number of villages, therefore extreme changes may have been influenced by a small initial baseline.

The dumbbell chart above illustrates changes in the number of mining villages across 38 provinces in 2021 and 2024. For this indicator, a decrease represents an improvement. Improvements were recorded in 9 provinces (24 percent), while deterioration due to significant increases was observed in 9 provinces (24 percent), and 20 provinces (52 percent) remained relatively unchanged or stagnant. As more than half of the provinces remained stagnant and a quarter experienced increases, improvements have not been distributed. The control of mining village expansion continues to progress slowly in many regions.

Figure. Access to Renewable Energy Financing



Source: PODES data 2021 and 2024 processed by CELIOS at 28 province level were used for energy credit (KPP-E) indicators. Potential was defined as the total number of villages per province (funding need), while realization was measured as the number of villages that have accessed KPP-E. The gap was calculated using the formula: Gap = total villages - villages accessing KPP-E. The left bars (gray) represent villages that have not yet been reached (gap), while the right bars (colored) represent villages that have been reached.

A substantial financing gap in the energy sector is evident. Across villages in Indonesia, only 1,643 villages, or approximately 1.95 percent, were recorded as having accessed energy credit (KPP-E). This indicates that the vast majority of villages have not yet been reached by this financing scheme. In absolute terms, Central Java exhibits the largest gap between the total number of villages and those that have accessed KPP-E, suggesting that the need for green financing penetration in this region is the highest. If financing schemes are not expanded and made more inclusive, efforts to advance the energy transition at the village level will be difficult to realize in practice.

Figure. National-Scale Access to Renewable Energy Financing by Province

Province	Potential	Achieved	Ratio	Gap
1 Highland Papua	2,634	1	0,04%	2,633
2 Southwest Papua	1,056	1	0,09%	1,055
3 West Papua	970	3	0,31%	967
4 North Maluku	1,209	4	0,33%	1,205
5 Central Papua	1,208	4	0,33%	1,204
6 Papua	1,029	6	0,58%	1,023
7 Riau Islands	430	3	0,70%	427
8 Southeast Sulawesi	2,292	16	0,70%	2,276
9 Aceh	6,516	47	0,72%	6,469
10 East Nusa Tenggara	3,538	29	0,82%	3,509
11 North Kalimantan	484	4	0,83%	480
12 Lampung	2,657	23	0,87%	2,634
13 North Sumatra	6,113	54	0,88%	6,059
14 Central Kalimantan	1,577	14	0,89%	1,563
15 Maluku	1,262	12	0,95%	1,250
16 South Sumatra	3,283	32	0,97%	3,251
17 South Papua	690	7	1,01%	683
18 Jambi	1,585	18	1,14%	1,567
19 Banten	1,552	19	1,22%	1,533
20 North Sulawesi	1,838	23	1,25%	1,815
21 Bangka Belitung Islands	393	5	1,27%	388
22 West Kalimantan	2,157	28	1,30%	2,129
23 East Kalimantan	1,052	14	1,33%	1,038
24 Bengkulu	1,514	21	1,39%	1,493
25 Central Sulawesi	2,022	31	1,53%	1,991
26 Riau	1,870	41	2,19%	1,829
27 South Sulawesi	3,060	71	2,32%	2,989
28 West Sulawesi	650	16	2,46%	634
29 West Sumatra	1,286	32	2,49%	1,254
30 South Kalimantan	2,015	51	2,53%	1,964
31 West Java	5,957	170	2,85%	5,787
32 Gorontalo	732	24	3,28%	708
33 Central Java	8,563	302	3,53%	8,261
34 East Java	8,494	366	4,31%	8,128
35 West Nusa Tenggara	1,166	53	4,55%	1,113
36 Bali	717	33	4,60%	684
37 Special Capital Region of Jakarta	267	13	4,87%	254
38 Special Region of Yogyakarta	438	52	11,87%	386

RENEWABLE ENERGY: POLICY AND INVESTMENT CHALLENGES

07

A 2024 report by the United States Agency for International Development (USAID) shows that RE investment in Indonesia reached only USD 0.28 billion, far below the USD 2.62 billion target. This gap highlights how financing remains a key obstacle to the expansion of RE. A 2025 study by CELIOS further finds that domestic bank lending is still largely directed toward extractive industries such as coal, totaling USD 5.6 million.

At the same time, inconsistent policy signals from the government continue to undermine investor confidence. A number of key regulations—including Presidential Regulation No. 112 of 2022, Ministry of Energy and Mineral Resources Regulation No. 10 of 2025, and Ministry of Energy and Mineral Resources Decree No. 188 of 2025 on the 2025–2034 Electricity Supply Business Plan (RUPTL)—still leave room for investment in non-renewable or “dirty” energy.

From the existing regulatory framework, at least two key challenges to RE development in Indonesia can be identified. First, current regulations still accommodate the continuation of fossil and other extractive energy pathways, including captive coal-fired power plants (PLTU), biomass, carbon capture and storage/Carbon Capture, Utilization, and Storage (CCS/CCUS), and geothermal energy. Second, the energy transition roadmap remains unclear, as the early retirement of PLTU is treated as discretionary, annual targets are not clearly defined, and transition policies remain heavily dependent on financing availability and short-term economic returns.

Beyond these issues, institutional challenges remain significant. The utilization of RE, particularly in the electricity sector, is still largely controlled under the PLN monopoly. This dominant position, combined with PLN’s involvement in the RE market, creates conditions for unfair competition. Non-competitive pricing further discourages private sector participation and investment in the sector. For example, following the enactment of the Omnibus Law, formally Law No. 11 of 2020 on Job Creation, as amended by Law No. 6 of 2023, permitting authority for rooftop solar installations was shifted from regional governments to the central government and placed largely under PLN’s control. Such developments contribute to an unhealthy investment climate for RE.

These structural challenges are further compounded by the Reciprocal Trade Agreement between Indonesia and the United States, concluded in early 2026. The agreement risks constraining Indonesia’s policy space in shaping its energy transition, creating additional

barriers to advancing RE investment. Beyond encouraging liberalization in exploration, power generation, and energy infrastructure, the agreement also promotes increased imports of fossil fuels from the United States—including crude oil, LPG, and coal—through multi-billion-dollar energy purchase commitments.

These challenges have the potential to hinder the growth of RE in Indonesia. Unsurprisingly, the share of RE in the national energy mix remains small compared to fossil fuels. A 2025 study by CELIOS shows that around 80 percent of Indonesia’s energy supply is still derived from fossil or non-renewable sources. This includes 39.4 percent from coal, 29.7 percent from crude oil, 17.4 percent from natural gas, and 1.7 percent from geothermal energy. In contrast, renewable sources contribute only a small share, including 2.4 percent from hydropower, 3.3 percent from wind, solar, and other sources, 4.5 percent from biofuels, and 1.1 percent from industrial biomass. Overall, installed RE capacity accounts for less than 20 percent of the total energy mix.



SHARED PROSPERITY IN RENEWABLE ENERGY: WHERE WE STAND TODAY

The RE landscape outlined above provides how limited the distribution of prosperity in the sector remains in Indonesia, as further illustrated in the Figure below.

Figure. Shared Prosperity Levels in Indonesia's Renewable Energy Sector





The data make it clear that RE has yet to deliver equitable benefits at the community level, particularly in rural areas. This signals a major unfinished agenda for the Indonesian government to close these gaps and ensure a more just energy transition.





A CALL FOR PROGRESSIVE GOVERNMENT ACTION

09

Reforming the national energy policy direction

National energy policy still provides significant space for fossil fuels, captive coal, and extractive energy schemes that hinder renewable energy acceleration

Responsible Actors

-  President
-  Ministry of Energy and Mineral Resources (MEMR)
-  National Development Planning Agency (Bappenas)
-  PLN

Policy Intervention

Establish a phased fossil fuel phase-out roadmap and strengthen village-based renewable energy priorities

Legal/Regulatory Reforms Required

Revision of Presidential Regulation No. 112/2022, adjustment of Government Regulation No. 79/2014 on National Energy Policy (KEN), evaluation of the National Energy General Plan (RUEN), and adjustment of PLN's Electricity Supply Business Plan (RUPTL) to make renewable energy targets legally binding and restrict new fossil fuel expansion

Implementation Mechanism

Annual target setting for fossil fuel reduction and minimum renewable energy targets for villages

Fiscal affirmation for energy-vulnerable regions

High energy inequality in Eastern Indonesia and regions with high energy vulnerability

Responsible Actors

-  Ministry of Finance
-  National Development Planning Agency (Bappenas)
-  Local Governments

Policy Intervention

Develop a fiscal transfer scheme based on the Energy Vulnerability Index (EVI)

Legal/Regulatory Reforms Required

Integration of EVI indicators into the Intergovernmental Fiscal Transfer (TKD) formula under the State Budget Law (APBN) and synchronization with the National Medium-Term Development Plan (RPJMN)




Implementation Mechanism

Energy affirmative funds for regions with the highest vulnerability burden

Accelerating electrification in remote villages

Around 658,000 households still lack electricity access

Responsible Actors

-  Ministry of Energy and Mineral Resources (MEMR)
-  Ministry of Villages
-  PLN

Policy Intervention

Prioritize off-grid and microgrid electrification models based on renewable energy

Legal/Regulatory Reforms Required

Revision of the implementing framework of Law No. 30/2009 on Electricity to allow community-based and village-owned electricity supply schemes





Implementation Mechanism

Solar home systems, village microgrids, hybrid renewable systems

Revitalizing household solar energy

Household solar energy adoption has significantly declined

Responsible Actors

-  Ministry of Energy and Mineral Resources (MEMR)
-  PLN
-  Financial Services Authority (OJK)
-  Banks

Policy Intervention

Provide rooftop solar subsidies and net-metering incentives

Legal/Regulatory Reforms Required

Strengthening MEMR Regulation No. 2/2024 on Rooftop Solar PV through procedural simplification, net-metering certainty, and consumer rights protection




Implementation Mechanism

Direct subsidies, concessional loans, household fiscal incentives

Optimizing village hydropower potential

Village hydropower potential remains largely underutilized

Responsible Actors

-  Ministry of Energy and Mineral Resources (MEMR)
-  Local Governments
-  Village-Owned Enterprises (BUMDes)

Policy Intervention

Accelerate micro-hydro and pico-hydro development based on village potential

Legal/Regulatory Reforms Required

Simplification of small-scale hydropower licensing and harmonization with Law No. 17/2019 on Water Resources and local spatial planning regulations




Implementation Mechanism

Water potential mapping and prioritized development assignments

Reforming village energy financing

Energy financing remains limited and inaccessible for rural communities

Responsible Actors

-  Financial Services Authority (OJK)
-  Ministry of Finance
-  State-Owned Banks

Policy Intervention

Establish dedicated green financing schemes for village energy development

Legal/Regulatory Reforms Required

Strengthening OJK's Sustainable Finance Regulation by requiring a minimum renewable energy financing portfolio for village-scale and community projects

Implementation Mechanism

Low-interest loans, risk guarantees, simplified financing access

Transition fund for mining villages

Mining villages face higher ecological pressures and energy transition barriers

Responsible Actors

-  Ministry of Energy and Mineral Resources (MEMR)
-  Ministry of Environment and Forestry (MoEF)
-  Local Governments
-  Mining Companies

Policy Intervention

Establish transition funds for extractive regions

Legal/Regulatory Reforms Required

Revision of Law No. 3/2020 on Mineral and Coal Mining (Minerba) to earmark a portion of non-tax revenues and post-mining funds for local energy and economic transition



Implementation Mechanism

Transition funds for local economic diversification and energy transformation

Protecting water resources

Increasing water pollution threatens hydropower potential

Responsible Actors

-  Ministry of Environment and Forestry (MoEF)
-  Local Governments

Policy Intervention

Tighten environmental permits and protect water catchment areas

Legal/Regulatory Reforms Required

Strengthening Law No. 32/2009 on Environmental Protection and Management, particularly Environmental Impact Assessments (AMDAL), Strategic Environmental Assessments (SEA/KLHS), and environmental permit reviews in strategic water catchment areas




Implementation Mechanism

Environmental audits and moratoriums on extractive permits in vulnerable regions

Integrating energy into village development planning

Most villages still lack renewable energy development programs

Responsible Actors

-  Ministry of Villages
-  Local Governments
-  Village Governments

Policy Intervention

Mainstream renewable energy as a village development priority

Legal/Regulatory Reforms Required

Revision of the Ministry of Villages Regulation on Village Fund Priorities and strengthening its mandate under the Village Law to prioritize productive energy development




Implementation Mechanism

Allocation of village funds for productive energy and renewable infrastructure

Strengthening community rights in renewable energy projects

Communities remain passive beneficiaries rather than energy owners

Responsible Actors

-  Parliament
-  Governments
-  Local Governments

Policy Intervention

Mandate FPIC, benefit-sharing, and community ownership in renewable energy projects

Legal/Regulatory Reforms Required

Revision of Law No. 30/2007 on Energy to incorporate Free, Prior and Informed Consent (FPIC), benefit-sharing obligations, and community ownership provisions




Implementation Mechanism

Energy cooperatives, village energy enterprises, community shares

Reforming renewable energy investment incentives

Renewable energy investment remains below national targets

Responsible Actors

-  Ministry of Finance
-  Investment Coordinating Board (BKPM)
-  Ministry of Energy and Mineral Resources (MEMR)

Policy Intervention

Reallocate fiscal incentives from fossil fuels to renewable energy

Legal/Regulatory Reforms Required

Revision of fiscal incentive policies under the Tax Harmonization Law (HPP) and investment regulations to provide affirmative measures for community-scale renewable energy investments

Implementation Mechanism

Tax holidays, blended finance, and investment guarantees

Establishing village energy transition monitoring systems

No integrated village-based energy monitoring system currently exists

Responsible Actors

-  Statistics Indonesia (BPS)
-  Ministry of Energy and Mineral Resources (MEMR)
-  National Development Planning Agency (Bappenas)

Policy Intervention

Build a national village energy transition dashboard using village census (PODES) data

Legal/Regulatory Reforms Required

Strengthening the legal basis for village energy reporting under the One Data Indonesia Presidential Regulation and technical sectoral reporting regulations

Implementation Mechanism

Integration of village census (PODES), PLN, and sectoral ministry data



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