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Advancing Socially Inclusive Sustainable Energy Transitions at the Subnational Level:

Evidence from South Sulawesi, Indonesia (SISET)

Synthesis Brief



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About SISET

The Socially Inclusive and Sustainable Energy Transition (SISET) project was designed to support subnational stakeholders in Indonesia in integrating renewable energy considerations into regional development planning. The project aimed to ensure that the energy transition contributes not only to decarbonisation and energy security objectives, but also to inclusive economic development, improved livelihoods, social equity, and strengthened institutional capacity at the local level. The SISET project was implemented over the period 2024 to 2026. It was carried out in phased stages, evolving from analytical and scoping work in 2024 to implementation-oriented activities in 2025, and concluding with validation, dissemination, and knowledge-sharing in 2026.

Why Focus on the Subnational Level?

While national governments establish overarching energy transition targets and policy frameworks, implementation ultimately takes place at the subnational level. Provincial and local governments play a critical role in translating national objectives into development plans, investment priorities, infrastructure decisions, and stakeholder engagement processes.

Energy transitions are not solely about decarbonisation; they are increasingly understood as a broader development agenda intersecting with economic growth, industrial transformation, job creation, energy security, and social inclusion. As such, energy transition planning is a multi-objective governance process that requires balancing climate goals with economic and social development priorities while ensuring that transition pathways respond to local contexts and needs.

At the subnational level, governments need to align these interconnected objectives and embed energy transition priorities within broader territorial strategies, including land-use planning, regional economic development, industrial competitiveness, and inclusive growth agendas. However, many subnational governments face institutional and capacity constraints, including fragmented mandates, limited coordination mechanisms, insufficient technical capacities, and a lack of practical tools to integrate energy transition considerations into planning processes.

SISET was designed to address these gaps through technical assistance, stakeholder engagement, capacity building, and the development of practical analytical tools. By strengthening local ownership, institutional coordination, and planning capacity, the project aimed to support more inclusive, context-specific, and sustainable energy transitions at the provincial level.

Why South Sulawesi?

South Sulawesi was selected as the primary focal province due to its strategic relevance to Indonesia's energy transition and regional development agenda.

The province has significant renewable energy resources, particularly solar and wind potential, while also serving as one of the most important economic and logistical hubs in Eastern Indonesia. As a gateway connecting Eastern and Western Indonesia, South Sulawesi plays a central role in trade, industry, transportation, and regional economic integration. Its growing economy and expanding industrial base create increasing demand for reliable and sustainable electricity, making it a particularly relevant context for examining the opportunities and challenges associated with renewable energy deployment.

Beyond its technical potential, South Sulawesi offers an important governance perspective. The province illustrates how subnational governments can influence energy transition outcomes through policy alignment, institutional coordination, development planning, and stakeholder engagement. Effective provincial leadership can demonstrate how renewable energy deployment can simultaneously contribute to national climate and energy objectives while advancing local economic development, industrial competitiveness, and social inclusion goals.

The SISET project selected South Sulawesi as a provincial focal point to develop a contextual understanding of provincial-level energy planning and implementation processes. The project also sought to understand how different stakeholder groups including government agencies, development actors, private sector representatives, civil society organisations, academia, and local communities perceive the opportunities, challenges, and requirements associated with a just and inclusive energy transition.

An additional consideration was the intention to maximise the project's added value by focusing on a province where targeted support could generate meaningful impact, while avoiding locations already receiving significant attention and investment from multiple development initiatives. This approach allowed SISET to complement existing efforts rather than duplicate them.

The final selection also drew upon insights from previous work undertaken by the UNEP Copenhagen Climate Centre (UNEP-CCC), Dala Institute, ongoing programmes funded by the Danish International Development Agency (DANIDA), and recommendations from key national institutions, including National Development Planning Agency (*Badan Perencanaan Pembangunan Nasional–Bappenas*), the National Energy Council (*Dewan Energi Nasional–DEN*), and Ministry of Energy and Mineral Resources (MEMR). This ensured that the project remained aligned with Indonesia's broader energy development agenda and emerging national policy priorities.

Project Implementation

The SISET project engaged Bappenas as its principal national political partner, providing strategic guidance and support for stakeholder engagement. At the subnational level, Bappelitbangda Sulawesi Selatan played a critical role in providing political support, convening stakeholders, and facilitating coordination across provincial agencies, ensuring alignment with provincial development priorities.

Implemented with national partner Dala Institute, SISET followed a phased and adaptive approach combining research, stakeholder engagement, policy dialogue, capacity building, and practical tool development (see Figure 1). The first phase in 2024 focused on province selection analysis and baseline assessment through literature reviews, policy analysis, stakeholder interviews, and consultations in Jakarta, South Sulawesi, and West Java. These activities provided insights into local planning dynamics, institutional challenges, stakeholder relationships, and opportunities to integrate socio-economic considerations into energy transition planning.

The implementation phase in 2025 focused on supporting policy discussions related to the RPJMD preparation in South Sulawesi, facilitating capacity-building workshops, strengthening stakeholder engagement, and supporting an informal coordination forum between Bappelitbangda Sulawesi Selatan and Dinas ESDM Sulawesi Selatan. During this period, SISET also developed a multi-module toolkit to support the integration of renewable energy, socio-economic development, gender equality, and social inclusion considerations into regional planning processes.

The final phase in 2026 focused on dissemination, validation, and knowledge sharing through consultations and workshops with provincial and national stakeholders. The project concluded with the finalisation of the toolkit and this report, capturing key findings, lessons learned, and opportunities for advancing socially inclusive and sustainable energy transitions at the subnational level.

Throughout these phases, the project generated evidence through a combination of literature and policy review, 51 semi-structured interviews, technical missions, stakeholder consultations, focus group discussions, and validation workshops. The provincial workshops and dissemination activities engaged stakeholders from 24 organisations in 2025 and 29 organisations in 2026, representing government and non-government institutions.

Ultimately, SISET demonstrated that energy transitions are not solely technical processes, but also opportunities to advance broader development objectives. While focused on South Sulawesi as a pilot province, the approaches, lessons, and tools developed through the project provide practical insights for other provinces seeking to align renewable energy development with socio-economic priorities. In this regard, SISET contributes to advancing a just, inclusive, and sustainable energy transition that supports not only decarbonisation and energy security, but also Indonesia's broader development ambitions.



Figure 1.
Summary of the SISET project activities

SISET Project Timeline and Key Activities (2024-2026)

Supporting socially inclusive and sustainable energy transition planning in Indonesia

PHASE 1
Baseline & Context Analysis
Jan - Sep 2024

PHASE 2
Co-creation & Capacity Building
Oct 2024 - Dec 2025

Province Selection Analysis
Multi-criteria analysis to identify two provinces with diverse contexts: South Sulawesi and West Java.

Baseline Study
Policy and literature review and 51 stakeholder interviews at national and provincial levels to understand energy, socio-economic and policy context.

National Consultations (Jakarta / ISEW)
Engagement with national ministries and agencies to validate findings and strengthen support for the project.

Field Visits & Stakeholder Engagement
Visits to South Sulawesi and West Java to gather in-depth insights and identify opportunities and challenges.

Initial Workstream Development
Co-design of workstreams based on findings and stakeholder inputs.

RPJMD Policy Engagement
Inputs to South Sulawesi RPJMD process through focus group discussion with Bappelitbangda and sectoral agencies.

Workstream Finalization
Finalization of three workstreams: (1) Data & Evidence, (2) Capacity Building, (3) Policy Engagement & Knowledge Sharing.

Capacity-Building Workshop (Makassar)
Strengthening understanding and skills on socially inclusive renewable energy planning and implementation.

Informal Coordination Forum
Established WhatsApp forum led by Bappelitbangda and Dinas ESDM to foster ongoing coordination and information sharing.

Toolkit Development
Co-creation of a practical toolkit to integrate social aspects into renewable energy planning.

Main milestone Key activity

PHASE 3
Dissemination & Project Closure
Jan - Jun 2026

Project Closure & Reflection
Closing the SISET project, capturing key lessons learned, and preparing the final report for the donor.

Dissemination (Across Levels)
Dissemination to national (Bappenas, MoHA, Kemendagri) and provincial stakeholders (including South Sulawesi) through online and offline meetings.

Toolkit Finalization & Validation
Incorporation of feedback and finalization of the toolkit.

Toolkit Dissemination Workshop (Makassar)
Presentation of the toolkit, feedback gathering, and peer learning with national and provincial stakeholders.

Key Output (Phase 1): Baseline reports for South Sulawesi and West Java and initial workplan for Phase 2.

Key Output (Phase 2): Workstreams implemented; capacity strengthened; draft SISET Toolkit developed.

Key Output (Phase 3): Finalized toolkit disseminated; key lessons and final report delivered.

OUR APPROACH
Participatory, inclusive, and adaptive process engaging government institutions, state-owned enterprises, academia, civil society, and development partners to integrate social dimensions into energy transition planning.

Deep implementation focus in **South Sulawesi**, with **West Java** as comparative learning context.



Explanatory note on socially inclusive energy transition

It is important to note that this report intentionally uses the term *socially inclusive energy transition* rather than gender, equity, disability and social inclusion (GEDSI), as the former adopts a broader, systems-level lens. The SISET project considers social inclusion as a wider institutional, economic, spatial, governance, and procedural dimensions that shape equitable energy transitions. This includes how policies, planning processes, financing, market structures, and institutional capacities influence who benefits from, participates in, and may be adversely affected by the energy transition. Importantly, economic development is considered a core element of a socially inclusive transition, rather than a separate outcome alongside it. Local economic development, including lower production costs, productivity improvements, job creation, and value addition in productive sectors, represents a key pathway through which renewable energy transitions can generate inclusive benefits. The broader framing is therefore intentional and better reflects the project's scope and analytical approach.



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Contents

Glossary 8

Purpose of the brief 10

Executive summary 11

01 Introduction 12

1.1 National context 12

1.2 The importance of subnational governance in energy transitions 13

02 Focus on South Sulawesi, Subnational Dynamics and the Gateway Role 15

2.1 Overview of existing RE profiles and emerging RE types in South Sulawesi 15

2.2 Type of demand on solar PV, wind, biomass 17

03 Large and small scale RE approaches 19

04 Capacity Gaps and Technical Assistance Needs 22

4.1 Provincial Coordination and Synchronisation Challenges in Renewable Energy Planning 22

4.2 Institutional and Governance Capacity Gaps 24

4.3 Financial and Economic Capacity Gaps 29

05 Key Lessons for policymakers and development partners 31

References 32



Glossary

APBD (Anggaran Pendapatan dan Belanja Daerah / Regional Revenue and Expenditure Budget)	The annual regional government budget used to finance programs, activities, and development priorities at the provincial or district level.
BPK (Badan Pemeriksa Keuangan)	The Supreme Audit Agency, Indonesia's highest independent state institution responsible for auditing the, management and accountability of state finances.
BUMDes (Badan Usaha Milik Desa / Village-Owned Enterprise)	A village-level economic institution owned by the village government and community that manages local economic activities and services, including renewable energy systems.
CSR (Corporate Social Responsibility)	Programs implemented by private companies to provide social, environmental, or economic benefits to communities surrounding their operations.
GEDSI (Gender, Equity, Disability, and Social Inclusion)	An approach ensuring that policies and programs address inequalities and promote equitable participation and benefits for women, vulnerable groups, and marginalized communities.
IKU (Indikator Kinerja Utama / Key Performance Indicator)	Strategic performance indicators used to measure the contribution of government agencies (OPD) to broader regional development outcomes.
IKK (Indikator Kinerja Kegiatan / Activity Performance Indicator)	Indicators used to measure intermediate results produced by specific programs or activities that contribute to IKU.
JETP (Just Energy Transition Partnership)	An international financing and cooperation initiative supporting Indonesia's transition to clean energy while ensuring affordability and social justice.
KEN (Kebijakan Energi Nasional / National Energy Policy)	Indonesia's overarching national policy that sets long-term direction and targets for the country's energy system.
OPD (Organisasi Perangkat Daerah / Regional Government Agency)	Government agencies at the provincial or district level responsible for implementing sectoral policies and development programs.
RKA (Rencana Kerja dan Anggaran / Work Plan and Budget)	A budgeting document prepared by government agencies that details planned expenditures based on the annual work plan (Renja).
Renja PD (Rencana Kerja Perangkat Daerah / Agency Annual Work Plan)	The annual planning document prepared by each government agency outlining programs, activities, outputs, and budget needs.
Renstra PD (Rencana Strategis Perangkat Daerah / Agency Strategic Plan)	A five-year strategic planning document prepared by each government agency aligned with the RPJMD.

RKPD (Rencana Kerja Pemerintah Daerah / Regional Government Work Plan)	The annual regional development plan that translates RPJMD priorities into yearly programs and activities.
RPJMD (Rencana Pembangunan Jangka Menengah Daerah / Regional Medium-Term Development Plan)	The five-year development plan of a province or district that sets development priorities, targets, and policy directions.
RUED (Rencana Umum Energi Daerah / Regional Energy Plan)	A provincial-level energy planning document aligned with RUEN that outlines regional energy targets, strategies, and programs.
RUEN (Rencana Umum Energi Nasional / National Energy Plan)	Indonesia's national long-term energy planning framework developed by the National Energy Council (DEN).
RUKD (Rencana Umum Ketenagalistrikan Daerah)	Regional electricity planning
RUPTL (Rencana Usaha Penyediaan Tenaga Listrik / Electricity Supply Business Plan)	PLN's long-term electricity development plan outlining generation capacity additions and infrastructure expansion.
Small-scale Renewable Energy	Renewable energy systems with relatively small generation capacity that typically serve communities, villages, or productive sectors.
Large-scale Renewable Energy	Utility-scale renewable energy projects designed to supply electricity directly to the national grid.
Socially Inclusive Energy Transition	An energy transition approach that ensures fair participation, equitable distribution of benefits, and recognition of diverse social groups.
Spatial Planning (RTRW / Rencana Tata Ruang Wilayah – Regional Spatial Plan; RDTR / Rencana Detail Tata Ruang – Detailed Spatial Plan)	Planning instruments that regulate land use and spatial allocation for infrastructure, economic activities, and environmental protection.
TVET (Technical and Vocational Education and Training)	Education and training programs designed to develop practical technical skills for sectors such as renewable energy installation and maintenance.

Purpose of the brief

This brief synthesises the key findings, evidence, and lessons generated through the SISET project (2024–2026). It consolidates outputs from the baseline study, technical missions, capacity-building workshops, focus group discussions, national consultations, engagement with the Regional Medium-Term Development Planning process (RPJMD), toolkit development[1], dissemination activities, and the final validation process. Indonesia's energy transition is advancing, supported by strong national targets and policy commitments. However, subnational planning has not yet translated renewable energy deployment into inclusive local development outcomes. The SISET project shows that planning, financing, and governance systems remain insufficiently aligned, limiting the extent to which renewable energy deployment contributes to broader development objectives. Overall, SISET identifies critical gaps in planning capacity, cross-sectoral coordination, and institutional capability that continue to hinder the effective integration of renewable energy into inclusive development strategies at the subnational level. The brief is intended for provincial governments (including Bappeda, ESDM, and relevant sectoral OPDs), national policymakers (MEMR, MoHA, DEN), development partners, and think tanks and research institutions. It translates project outputs into a coherent evidence base to support informed decision-making and strengthen policy and planning processes.

By bringing together the various strands of the project, the brief highlights key achievements, challenges, and opportunities, and presents actionable recommendations for future policy development and implementation. It also serves as a consolidated reference for understanding the project's contribution to strengthening planning, decision-making, and institutional capacity at the subnational level, with a particular focus on South Sulawesi.



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1 Further details can be found in the accompanying *Socially Inclusive and Sustainable Energy Transition (SISET) Toolkit and Roadmap: Integrating* Renewable Energy into Regional Development Planning in Indonesia, which provides additional methodologies, practical tools, and illustrative examples to support implementation. Access the toolkit document through https://dala.institute/publications/socially-inclusive-and-sustainable-energy-transition-siset-toolkit

Executive summary

Indonesia is advancing its energy transition through ambitious national targets, financing initiatives, and supportive regulatory frameworks. However, translating these ambitions into tangible outcomes at the subnational level remains a significant challenge. While renewable energy deployment has become a national priority, its expansion has not yet consistently generated broader economic development, local investment, or inclusive socio-economic benefits across provinces. The constraints extend beyond resource availability and technological feasibility to include subnational governance, planning, financing, and institutional capacity. Several local governments continue to face challenges in integrating renewable energy into development planning, mobilizing investment, fostering cross-sectoral coordination, and translating national policy objectives into locally relevant, bankable projects that create sustainable economic opportunities.

There is a risk that national energy transition targets may be achieved in aggregate, while failing to generate local economic development, employment creation, and just transition outcomes at the subnational level. This risk is amplified when subnational governments who are critical for permitting, spatial planning, investment facilitation, and stakeholder coordination lack the technical, institutional, and financial capacity to translate national policy objectives into implementable and investable projects.

Evidence from South Sulawesi shows that:

- Renewable energy deployment is increasing, but remains weakly linked to local economic development,
- Planning systems (RUED, RPJMD, sectoral plans, and budgets) operate in silos,
- Subnational governments have limited fiscal space, coordination mechanisms, and implementation capacity.

The SISET project indicates that renewable energy is still treated mostly as a sector-specific infrastructure issue, rather than as a cross-sectoral driver of productivity, jobs, and inclusive growth. This narrow framing limit planning primarily to generation capacity, grid integration, and project deployment, while underemphasizing its systemic linkages to industrial policy, spatial and land-use planning, skills development, local enterprise ecosystems, and fiscal strategy. In practice, this leads to fragmented implementation: projects may be delivered successfully in technical terms, but remain weakly embedded in local value chains, employment systems, and broader development planning frameworks, thereby constraining their wider development impact.

Yet the opportunity is clear.

When integrated into sectors such as agriculture, fisheries, MSMEs, and industry, renewable energy can:

- Reduce production costs and fuel dependency,
- Improve productivity, value addition and job creation,
- Strengthen rural livelihoods and economic resilience,
- Support inclusive economic participation, including for women and youth.

Realizing these benefits requires a shift from deployment-focused approaches to integrated, development-oriented planning and implementation.

The project supported the following:

- Emphasized the importance of leveraging socio-economic development opportunities alongside renewable energy expansion through awareness raising and capacity-building sessions
- Developed a practical toolkit with coordination mechanisms, project examples, and concrete steps for embedding RE into cross-sectoral programs
- Established an informal working group with the representation of energy and development agencies sectoral OPDs and thematic OPDs such as gender, education etc.

Collectively, these efforts represent core levers for advancing a socially inclusive energy transition by strengthening coordination, planning capacity, and the integration of socio-economic priorities into renewable energy development.



01. Introduction

1.1 National context

Indonesia is advancing toward a sustainable energy transition aimed at reducing dependence on fossil fuels and lowering carbon emissions, guided by increasingly ambitious national climate commitments.[2]

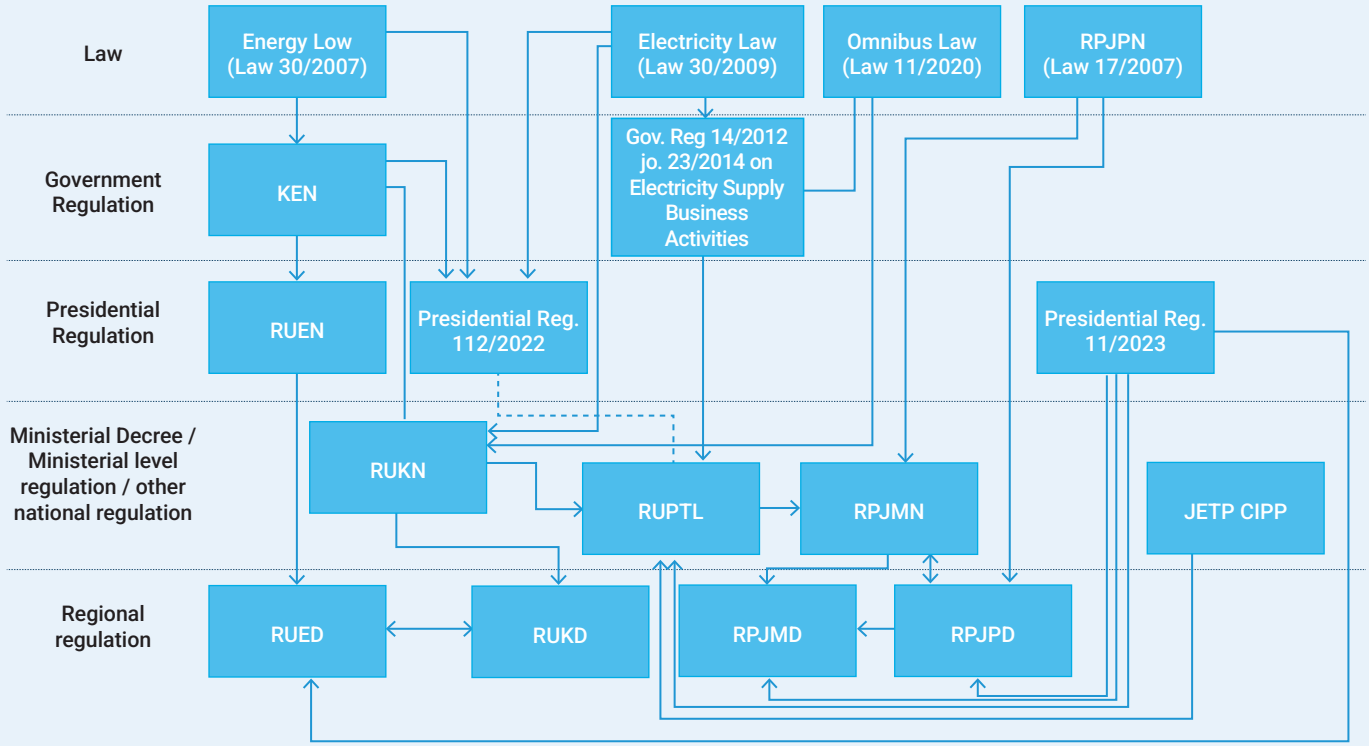
Through its Enhanced Nationally Determined Contribution (E-NDC) and the Long-Term Strategy for Low Carbon and Climate Resilience 2050, the country targets significant emissions reductions by 2030 and net-zero emissions by 2060. Key enabling initiatives such as the Just Energy Transition Partnership (JETP) and Presidential Regulation No. 112/2022 on the acceleration of renewable energy development further support this transition by mobilising finance for infrastructure upgrades, accelerating the phasedown of coal-fired power generation, and scaling up renewable energy deployment.

Indonesia's energy planning architecture (particularly power sector) is structured across multiple governance levels (Figure 2). At the national level, Government Regulation No. 79/2014 on the National Energy Policy (Kebijakan Energi Nasional–KEN) provides the overarching framework, which is operationalised through the National Energy General Plan (Rencana Umum Energi Nasional–RUEN). RUEN is periodically reviewed by the National Energy Council (Dewan Energi Nasional–DEN), an independent body mandated to oversee national energy policy coherence. The role of subnational governments in renewable energy planning has also been strengthened through Presidential Regulation No. 11/2023 on Additional Concurrent Government Affairs in the Renewable Energy Sub-sector, which expands provincial responsibilities in supporting renewable energy development. At the subnational level, provinces are required to translate RUEN into Regional Energy Plans (Rencana Umum Energi Daerah–RUED), as mandated by Presidential Regulation No. 73/2023, ensuring alignment between national objectives and local energy planning.

In principle, RUED is designed to be integrated with other regional planning instruments, including regional electricity planning (Rencana Umum Ketenagalistrikan Daerah–RUKD), provincial industrial development plans (Rencana Induk Pembangunan Industri Provinsi–RIPIP), spatial planning frameworks (Rencana Tata Ruang dan Wilayah–RTRW), and broader development strategies such as the Regional Medium-Term Development Plan (Rencana Pembangunan Jangka Menengah Daerah–RPJMD) and Long-Term Development Plan (Rencana Pembangunan Jangka Panjang Daerah–RPJPD). This multi-layered system is intended to enable coherence between energy, spatial, and economic development priorities. However, in practice, integration remains limited. Economic development dimensions such as industrial upgrading, local content development, job creation, and skills formation are often underemphasised or insufficiently operationalised within energy planning processes. Similarly, stakeholder participation, including engagement with local communities, is frequently treated as procedural compliance rather than a substantive input into decision-making.

2 SISET, baseline analysis report (2024)

Figure 2.
Energy transition policy framework in Indonesia's power sector



Source: Author's elaboration based on the literature review on the policy documents

1.2 The importance of subnational governance in energy transitions

Subnational governance is critical to energy transitions because these processes unfold across multiple levels of government, where national ambitions need to be translated into concrete planning, investment, and implementation decisions. Research on multi-level governance highlights that regional and local governments act not only as implementers, but also as intermediaries and policy shapers, influencing how transition pathways are adapted to local socio-economic, political, and infrastructural conditions (Cowell et al., 2017; Setyowati et al., 2022).

This dynamic is particularly evident in Indonesia, where the effectiveness of renewable energy transitions depends heavily on coordination between national and subnational actors, as well as on subnational institutional capacity, policy awareness, and stakeholder engagement. Drawing on the Indonesian context, Marquardt (2014) demonstrates that weak consultation processes, limited local ownership of national energy objectives, and capacity constraints at the subnational level can significantly undermine renewable energy deployment. Their findings underscore that capable and empowered subnational governments are essential for aligning national transition goals with local development priorities, ensuring policy coherence, and overcoming implementation bottlenecks inherent in decentralised governance systems.

Building on this, Marquard et al. (2025) examined three long-term renewable energy support programmes in Indonesia, each implemented over a decade. While all three initiatives focus on off-grid electrification, they differ in emphasis: capacity development under Energizing Development Indonesia, policy advisory through the Indonesia Clean Energy Development programme, and a more comprehensive territorial approach under the Sumba Iconic Island initiative. The authors find that development partners play an important role in introducing new ideas and shaping narratives around renewable energy, and they also exert some influence on the formulation of policies, rules, and regulatory frameworks. However, the study also shows that these programmes face persistent challenges in driving deeper institutional transformation, such as the development of new ministerial competencies or the embedding of new political and administrative practices that would fully institutionalise renewable energy within the broader energy sector. As a result, sustaining renewable energy transitions beyond the lifecycle of external support remains a key challenge for development partner supported interventions.

At the same time, subnational governments in Indonesia face several structural constraints in advancing renewable energy development. These include the need for multiple derivative instruments to translate Provincial Energy Plan (RUED) commitments into implementable actions, limited legal authority relative to national institutions, and differing development priorities across sectors and levels of government. Budgeting represents a particularly significant challenge, as subnational allocations fall under the oversight of the Ministry of Home Affairs (MoHA).[3] MoHA governs a highly structured national budgeting architecture, including Permendagri No. 90/2019 and the SIPD system. In practice, local governments are often concerned about avoiding warnings or sanctions from the Supreme Audit Agency (BPK) for budgetary non-compliance than achieving specific energy or climate targets. Sectoral agencies, such as those responsible for agriculture or fisheries, cannot simply create budget lines for solar infrastructure or other energy-related investments if the relevant expenditure categories do not exist within the approved national nomenclature and tagging system. Without accompanying national-level regulatory reforms led by the MoHA and the Ministry of Finance, many of the proposed cross-sectoral budgeting recommendations are likely to remain legally and administratively difficult to implement.

Within this context, funding for renewable energy is typically permissible mostly for remote electrification and energy conservation, restricting the scope of eligible activities and making it difficult for provincial and local governments to justify broader renewable energy initiatives within formal budgetary mandates (IESR, 2021).

These constraints are further shaped by the evolving rescaling of Indonesia's energy governance system, characterised by frequent regulatory adjustments and shifting institutional arrangements. While decentralisation has expanded local responsibilities, particularly in environmental governance, the electricity sector remains comparatively centralised, with the central government and PLN continuing to play a dominant role in shaping transition pathways. As a result, provincial and local actors involved in RUED development need to navigate regulatory uncertainty and institutional boundaries while attempting to advance energy transition objectives in ways that remain aligned with national priorities (Setyowati and Quist, 2022).



3 Local governments can deploy a range of instruments such as governor's instructions to help accelerate the energy transition. In terms of codification and budget nomenclature, regional budgeting for new and renewable energy (NRE) refers to Minister of Home Affairs Regulation (Permendagri) Permendagri No. 90/2019 https://iesr.or.id/en/agenda-iesr/accelerating-renewable-energy-in-central-java/
See Toolkit Module 2 for further information on the hierarchical structure of local government planning as regulated by national frameworks particularly under MOHA.



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02. Focus on South Sulawesi, Subnational Dynamics and the Gateway Role

South Sulawesi's significance in Indonesia's energy transition derives not only from its abundant renewable energy potential but also from its strategic geographic and economic position as a gateway between Eastern and Western Indonesia, serving as a dynamic economic and logistical hub that connects the archipelago[4]. This dual role underlines the importance of robust subnational governance, where effective provincial leadership in policy alignment, socio-economic planning, and institutional coordination is essential. Such governance capacity could enable the region to model successful renewable energy deployment that simultaneously advances national energy transition targets and local development objectives.

As a province structurally dependent on land-intensive economic sectors, South Sulawesi therefore represents a particularly important case for understanding how subnational governance can integrate sustainable natural resource management with both distributed and utility-scale renewable energy systems to support climate resilience, environmental sustainability, and long-term livelihood security.

The IESR has identified Sulawesi as one of the islands that can, in principle, be fully electrified by renewable energy, with a substantial share of solar and wind resources capable of serving local demand and supporting broader grid resilience, if system flexibility and planning integration are strengthened (Halim, 2025). Its potential for renewable energy is further underscored by regional estimates indicating significant scalable solar, hydro, and biomass generation possibilities, which could contribute meaningfully to both provincial energy security and national decarbonisation goals.

4 SISET, baseline analysis report (2024).

2.1 Overview of existing RE profiles and emerging RE types in South Sulawesi

South Sulawesi has a total installed power capacity of approximately 1,622 MW, with hydropower accounting for nearly half (756 MW), followed by wind and solar contributing a smaller share of around 144 MW. [5] Despite this relatively modest share of variable renewable energy, the province has already exceeded its renewable energy mix target under the RUED, reaching 28.82 percent against a 2025 benchmark of 20 percent.[6] Future planning frameworks, including the RUED and PLN's RUPTL, envisage a transition toward a 35 percent renewable energy share by 2030, driven in part by a projected increase in electricity demand to 31 TWh, largely associated with energy-intensive industrial expansion such as smelters. Hydropower is expected to remain the dominant renewable energy source in the medium term, complemented by wind, solar, and mini hydro developed by both PLN and independent power producers. [7] While South Sulawesi has significant potential in hydropower and wind, solar energy despite being identified as the most abundant

5 Findings presented by PLN UID Sulselrabar during the site visit.

6 While this represents an overachievement of the province's aggregate renewable energy target, the energy mix indicator primarily measures deployment and does not capture the extent to which renewable energy development generates broader socio-economic benefits, including local employment, skills development, productive use, and inclusive participation. This distinction highlights a key gap addressed by SISET: progress in renewable energy deployment does not automatically translate into inclusive local development outcomes.

7 Rencana Pembangunan Rendah Karbon Daerah/Low Carbon Development Plan (RPRKD).

resource remains comparatively underutilised[7], with progress shaped by ongoing feasibility assessments and hybrid system development, particularly for island electrification and remote areas. Key pipeline projects across hydropower (PLTA), solar (PLTS), mini hydro (PLTM), and wind (PLTB), led by PLN and IPPs, are summarised in Table 1.

Table 1:
South Sulawesi pipelines across planning documents

RUED 2021-2050	RPJMD 2018-2023	RUPTL 2021-2030
PLTG	PLTG/MG/GU in Makassar	PLTA Poso, Poko, Seko, Tumbuan, and Bakaru 2
PLTMG	PLTS Rooftop in Makassar	PLTS Selayar and others (not specifically mention the locations)
PLTA	PLTA Bakaru II in Parepare	PLTMG Selayar II
PLTM	PLTA Poko in Parepare	PLTMH Ussu Malili, Bungin III, Madong, Belajen, and others
PLTMH	PLTMG Selayar II in Bulukumba	PLTB across Sulsel (not specifically mentioned the locations)
PLTB		ESDM's proposal for an additional 70 MW of PLTB (COD 2026) considers wind potential. However, since the VRE quota is already full and technically cannot be added anymore, the additional wind power plant is required under the battery firming scheme and financially not more than 7 cent/kWh.
PLTBioenergi		Hydropower will be developed to supply large customers (smelter industry)



8 Findings presented by Dinas ESDM South Sulawesi during the site visit.

2.2 Type of demand on solar PV, wind, biomass

In South Sulawesi, households account for the highest electricity consumers, followed by industry. The southern area, specifically the city of Makssar and its surroundings, accounts for most of the electricity demand in South Sulawesi. Smelter electricity demand is increasingly being recognised in RUPTL as a significant consumer of PLN. Meanwhile, the primary energy potential (hydro and gas) is in the north and center of the province. The electrification ratio has reached 99.9% with the encouragement of solar power plant construction in small and remote islands in the last five years[9]. The population in disadvantaged, frontier, and outermost (3T) areas still require electricity development, which PLN initiated through the 'SUPERSUN micro solar power plant (PLTS) Panel' program. However, challenges remained for the sustainability (i.e., maintenance) of these power plants. Despite South Sulawesi's relatively high RE share, the power system continues to experience reliability challenges, including electricity disruptions during dry seasons when reduced river flows constrain hydropower generation. These supply constraints are particularly significant in areas dependent on variable renewable resources, where intermittency and limited system flexibility complicate power management. Such disruptions can affect economic activity, including small and medium-sized enterprises (SMEs) that rely on a stable electricity supply. Thus, where there is a decline in hydropower availability, solar PV provides an important counter-cyclical opportunity by contributing additional generation when hydro output is constrained (Hasjanah and Arinaldo, 2026). Addressing intermittency, however, requires complementary investments in grid flexibility, storage, and system operation. IESR's Sulawesi power system modelling identifies battery energy storage systems (BESS), strengthened interconnection, and more flexible grid management as key measures to enable higher penetration of variable renewable energy (Halim, 2025). There is an opportunity here to reinforce in the next RUPTL cycle to move beyond fixed grid constraints and incorporate explicit flexibility planning, including strategic deployment of battery storage, to accelerate renewable energy integration in Sulawesi.

2.2.1 Decentralized Renewable Energy at the Sub-national Level

Despite its abundant renewable energy potential including solar, wind, biomass, and marine-based resources and its strategic role in Indonesia's resource and manufacturing supply chains, South Sulawesi has yet to translate energy availability into broader socio-economic benefits. While the province has achieved high electrification rates and expanded renewable energy deployment through nationally driven, utility-scale investments such as the Sidenreng Rappang (Sidrap) and Jeneponto wind farms and biomass co-firing initiatives, these achievements have not been systematically linked to local economic development outcomes.

A key constraint lies in limited integration between energy and developing planning frameworks. Although provincial planning architecture is intended to align the Regional Energy Plan (RUED), Regional Medium-Term Development Plan (RPJMD), sectoral strategic plans (Renstra), and budget allocations, these linkages remain weak in practice. Renewable energy is often treated as a technical or infrastructure issue rather than as a cross-cutting enabler of economic transformation. As a result, opportunities to use renewable energy to stimulate rural income generation, strengthen MSMEs, support women's economic participation, develop local skills, and drive structural economic change remain underutilised (See Boxes 1 and 2 as examples).

This disconnect is particularly significant given South Sulawesi's economic structure and development priorities. The province has positioned green and blue economy development as a strategic direction, with agriculture, fisheries, livestock, MSMEs, and resource-based industries forming the backbone of livelihoods and regional growth. These sectors are energy-intensive, geographically dispersed, and highly dependent on reliable and affordable energy services, making them well suited to decentralised and productive-use renewable energy solutions. Yet current planning instruments do not adequately capture energy demand across productive sectors or embed renewable energy into sectoral investment pathways and regional economic strategies.

The consequences are visible across local production systems. Agriculture, fisheries, and livestock activities continue to rely heavily on diesel-powered irrigation, cold storage, processing, and transport infrastructure, exposing producers to high operating costs and fuel price volatility. Emerging experience within the province including solar-powered irrigation initiatives in regencies such as Gowa demonstrates that decentralised renewable energy can generate immediate development benefits through lower production costs, improved productivity, and more stable rural incomes[10] (See Box 1). Off-grid and mini-grid solutions also offer opportunities for remote islands and underserved areas by strengthening resilience, supporting MSME growth, and expanding livelihood opportunities.

9 Legal foundations to encourage access to electricity in remote communities: Presidential Regulation No. 47 of 2017 concerning LTSHE, Minister of Energy and Mineral Resources Regulation No. 33 of 2017 concerning Procedures for Providing LTSHE for Communities That Have Not Gained Access to Electricity and Minister of Energy and Mineral Resources Regulation No. 36 of 2018 concerning Operational Guidelines for the Implementation of DAK Fisik Assignment of Small Scale Energy Sector

10 An initiative of productive use of small-scale renewable energy by Universitas Negeri Makassar (UNM) and SISET mission report (June 2025).

Box 1

Renewable Energy and Local Development Linkages in South Sulawesi

Practical experience in South Sulawesi demonstrates that renewable energy can directly support local development objectives. Solar-powered irrigation systems in Gowa, for example, have helped reduce operational costs, reduce dependency on diesel, while improving agricultural productivity and strengthening rural livelihoods. These experiences illustrate how renewable energy can function not only as an infrastructure investment, but as an enabler of broader economic development (Akil et al., 2024).

In Lempangang Village, Gowa regency solar-powered irrigation pumps directly reduced farmers' production costs previously, diesel pumps cost approximately IDR 1,000,000 per pumping cycle to irrigate about 1 hectare, requiring 3-4 days of operation at 4-6 hours per day. After the initial solar system investment, operational costs became close to zero. The solar powered system can irrigate approximately 600 m² per day, operating autonomously during daylight hours, enabling more stable water flow and freeing farmers' time for other agricultural tasks. (Darmawan et al., 2022).

However, renewable energy targets alone will not deliver inclusive development outcomes. Workshop findings under SISET and regional planning consultations indicate that implementation gaps persist even where renewable energy targets exist. Provincial governments frequently face constraints related to technical capacity, low awareness on renewable energy co-benefits, institutional coordination, and fiscal flexibility, limiting their ability to convert strategic plans into executable projects. These governance challenges are particularly important in South Sulawesi, where agriculture, forestry, and fisheries remain central to livelihoods and economic output. Between 2011 and 2019, these sectors accounted for 21% of provincial GDP substantially above the national average yet agricultural productivity has shown signs of decline over the past decade.[11] Evidence from ICRAF suggests that deteriorating environmental conditions, land degradation, and declining ecosystem carrying capacity are increasingly affecting agricultural and plantation yields (Evans and Millott, 2020; Antara, 2025). In this context, renewable energy deployment can support broader socio-economic resilience beyond decarbonisation objectives alone.

Distributed renewable energy systems including solar-powered irrigation, cold storage, and agro-processing infrastructure can improve productivity, reduce post-harvest losses, strengthen rural livelihoods, and support value addition across agricultural value chains (GIZ, 2024; FAO, 2026). Utility-scale renewable energy investments may also contribute to improved system reliability and lower energy costs for energy-intensive manufacturing and processing activities. However, these benefits are unlikely to materialise without complementary interventions to strengthen agricultural value chains, support MSMEs and cooperatives, improve climate-resilient infrastructure, and better align energy investments with regional development priorities (See Box 2).

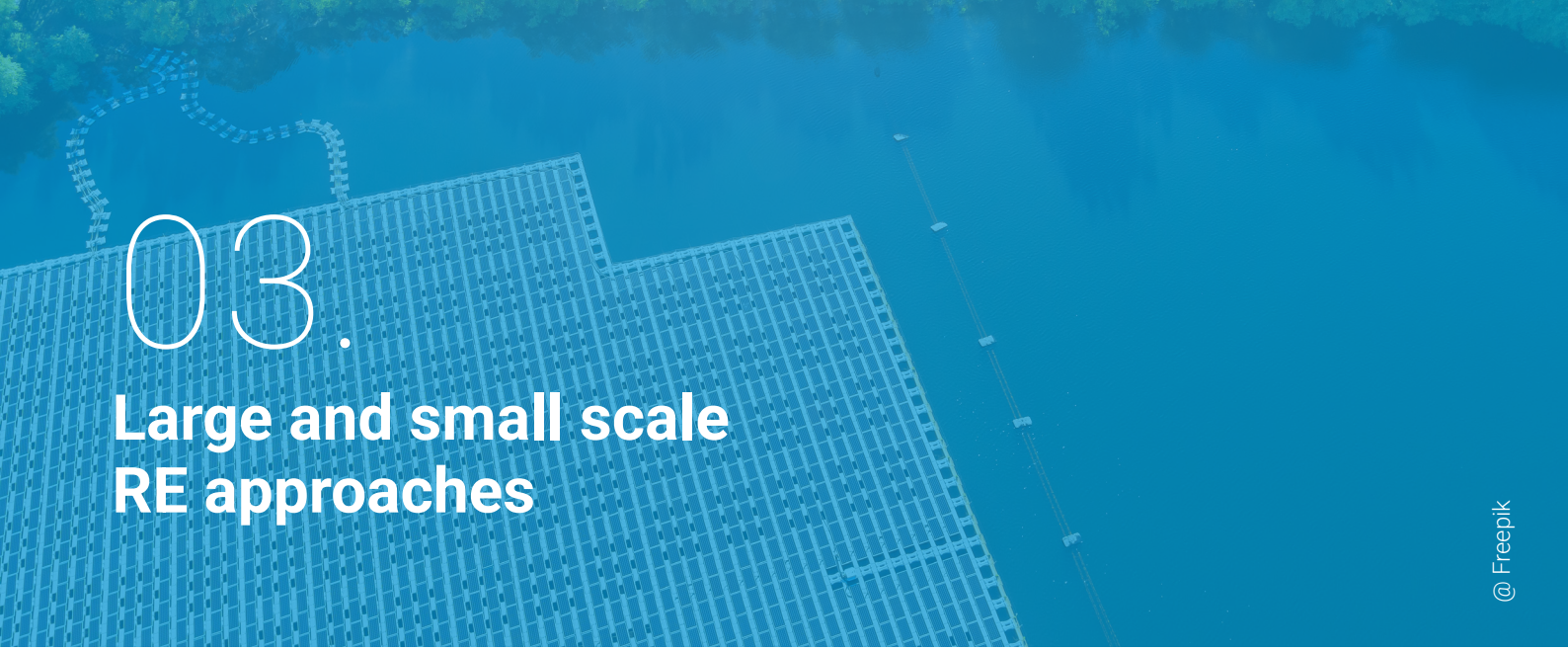
Box 2

Opportunities already exist to deploy renewable energy in productive sectors

In fisheries, for example, solar-powered cold storage and ice-making facilities can reduce spoilage, lower dependence on diesel, improve product quality, and strengthen the competitiveness of coastal value chains. In Lenggora Pantai, Southeast Sulawesi, the village enterprise (BUMDesa) operates two interconnected business units, electricity services and ice-making for fisheries. The ice-maker business generates IDR 4-5 million monthly (USD 230-330), eliminating fishermen's risky boat travel to neighboring villages for ice and enabling better fish preservation and market prices. Since inception, BUMDesa accumulated IDR 30.8 million (USD 2,000) in savings while the electricity unit saved IDR 97.8 million (USD 6,300).

South Sulawesi therefore illustrates a broader challenge in Indonesia's energy transition: progress in renewable energy deployment at the national and utility scale does not automatically translate into inclusive and development-oriented outcomes at the subnational level. Realising these benefits requires stronger alignment between energy and development planning, integration of renewable energy into productive sectors, and institutional mechanisms that connect planning mandates with financing and implementation.

11 Between 2011 and 2019, the province's economy was driven primarily by agriculture, forestry, and fisheries, accounting for 21.3% of provincial GDP compared to a national average of 12%, alongside manufacturing (13%) and construction (14%) (Evans and Millott, 2020).



03.
Large and small scale RE approaches

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Renewable energy development in Indonesia follows two distinct implementation pathways, each shaped by different governance arrangements and producing different development outcomes. Large-scale renewable energy projects including wind farms, floating solar, and grid-connected generation assets are primarily driven by national priorities and industrial strategies. These investments follow a top-down planning model guided by the RUPTL and RUEN, with project development largely initiated and coordinated by the MEMR and PLN. While these projects contribute to national energy and emissions targets, they are often only weakly connected to regional development priorities articulated in provincial energy planning instruments such as RUED and RUKD. Findings from the SISET project suggest that utility-scale investments frequently proceed without sufficient consideration of local economic opportunities, spatial development priorities, emerging industrial zones, or district-level development challenges. Consequently, provincial and spatial planning frameworks are often adjusted to accommodate incoming investments rather than being used proactively to maximise local socio-economic benefits. It must be noted that, major transmission investments are reshaping South Sulawesi's renewable energy landscape. PLN's Green Enabling Super Grid (GECS) for Sulawesi is expected to reduce transmission constraints and support greater integration of large-scale renewable energy (CMEA, 2026). However, while improved transmission can attract investment, it does not automatically ensure local economic and development benefits. This reinforces the findings from SISET, on the need to strengthen subnational capacities to develop renewable energy projects that align with local priorities and deliver inclusive socio-economic outcomes. See opportunities to link renewable energy deployment with workforce development (See Box 3 and 4), local value creation, MSME participation, and more balanced regional growth (See SISET toolkit module 4 for lessons learned from large scale RE projects).

Conversely, smaller-scale renewable energy initiatives including rooftop solar PV, mini-grids, and productive-use applications such as solar-powered irrigation, cooling, and agro-processing follow a more decentralised model (See SISET toolkit module 3 for examples and lessons learned from small-scale RE projects). These projects are commonly initiated through local government requests, community demand, or targeted government programmes such as village electrification initiatives and typically involve a broader range of actors, including local governments, NGOs, private investors, and regional PLN offices. Because of their scale and flexibility, decentralised systems are often better positioned to respond to local development needs and support productive sectors. However, deployment remains fragmented and insufficiently embedded within formal planning and investment processes. Weak standardisation, inconsistent monitoring frameworks, and limited integration with broader energy and development strategies constrain scalability and long-term impact.

A further challenge relates to implementation sustainability. Limited attention is given to the operations and maintenance of decentralised systems, resulting in poor system performance, reduced reliability, and lower rates of sustained uptake. Provincial governments often lack the mandate and fiscal capacity to support long-term maintenance, while local technical and vocational education and training (TVET) institutions and MSMEs frequently lack the technical skills, institutional support, and business models needed to provide ongoing servicing and maintenance[12] (See SISET toolkit module 6 explaining capacity gaps and opportunities for actionable activities to close the gap).

12 This observation is based on qualitative evidence generated through SISET stakeholder consultations, focus group discussions, workshops, and key informant interviews conducted in South Sulawesi between 2024, 2025 and 2026.

Box 3

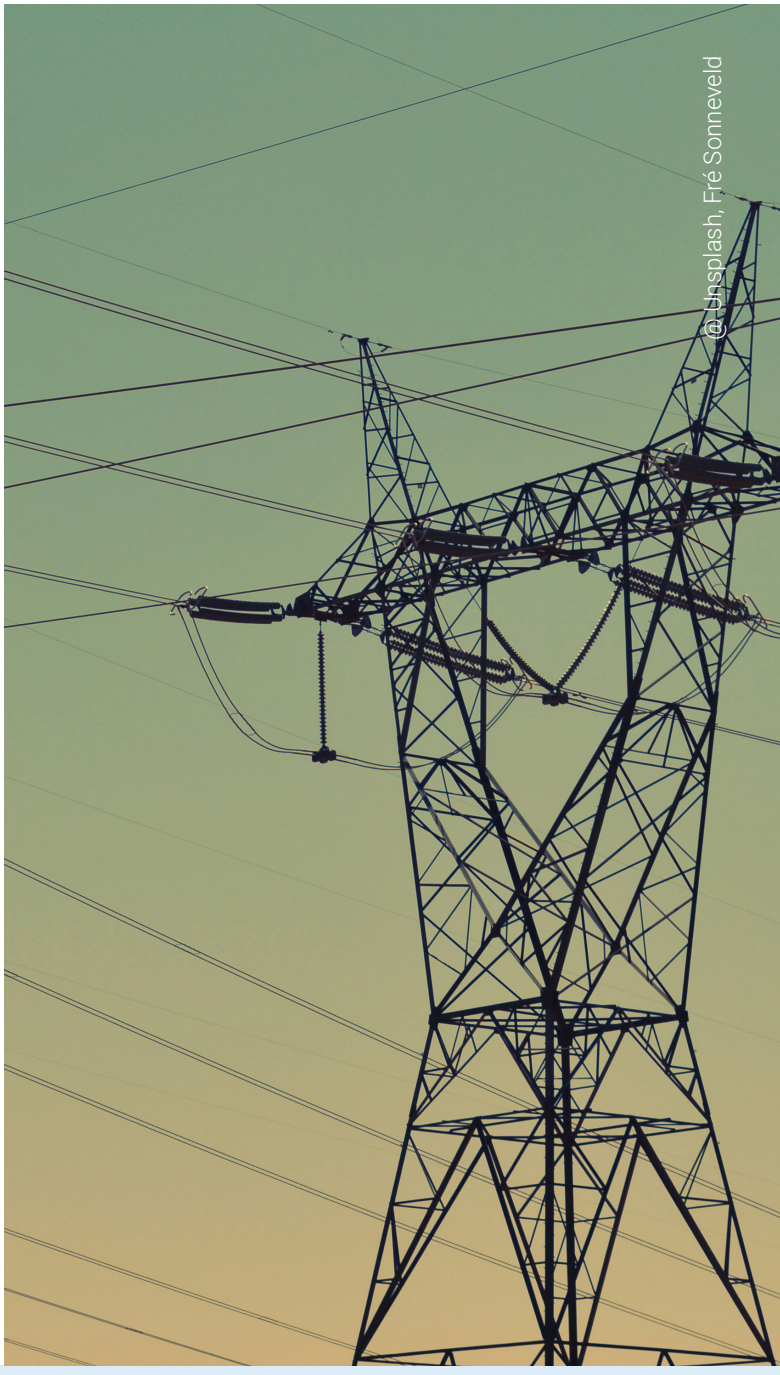
Lessons learnt in terms of workforce from large scale RE project, a case of Sidrap Wind Farm, South Sulawesi and Cirata Floating solar in West Java

Large-scale wind and solar projects such as Sidrap Wind Farm (75 MW) and Cirata Floating Solar (145 MW) had shown gaps in local benefit-sharing and workforce integration. Most jobs occurred during the construction period, with limited long-term O&M roles. There was limited local technical capacity as Sidrap imported specialists during EPC, Cirata required specialized floating-solar expertise, consistent with findings that O&M skills often need to be imported unless local training pipelines exist. Sidrap Phase 3 now aims for up to 60% local workforce,[13] reflecting lessons learned.

This shift highlights two realities:

- Skills need to be built before large-scale projects break ground, not after.
- Projects need tailored skill pipelines (wind technicians, floating solar O&M teams, safety compliance roles, environmental monitoring)

This distinction between centrally coordinated utility-scale investments and fragmented decentralised deployment reflects a broader institutional tension within Indonesia's energy transition. Although decentralisation reforms have expanded local government responsibilities including in environmental governance the electricity sector remains comparatively centralised, with the central government and PLN retaining significant influence over energy planning and system operation[14]. This creates important constraints for subnational energy transitions and shapes the types of renewable energy initiatives that provinces can pursue.



13 The 60% local workforce was shared by Bappeda Sidrap during the SISET Workshop, Makassar in June 2025. https://unepccc.org/sulawesi-renewable-energy/

14 This observation draws primarily on qualitative evidence generated through the SISET project, including key informant interviews, focus group discussions, stakeholder workshops, and continuous engagement with national and subnational stakeholders between 2024 and 2026. These findings are synthesised in the SISET background (needs assessment) reports, provincial comparison report, and Toolkit. Where external literature or policy documents are referenced, these are explicitly cited in the text, particularly in the Toolkit.

Box 4

Accredited Certification Pipelines, Not Generic Skills Alignment, Determine Local Workforce Capture (UNOPS, 2025a)

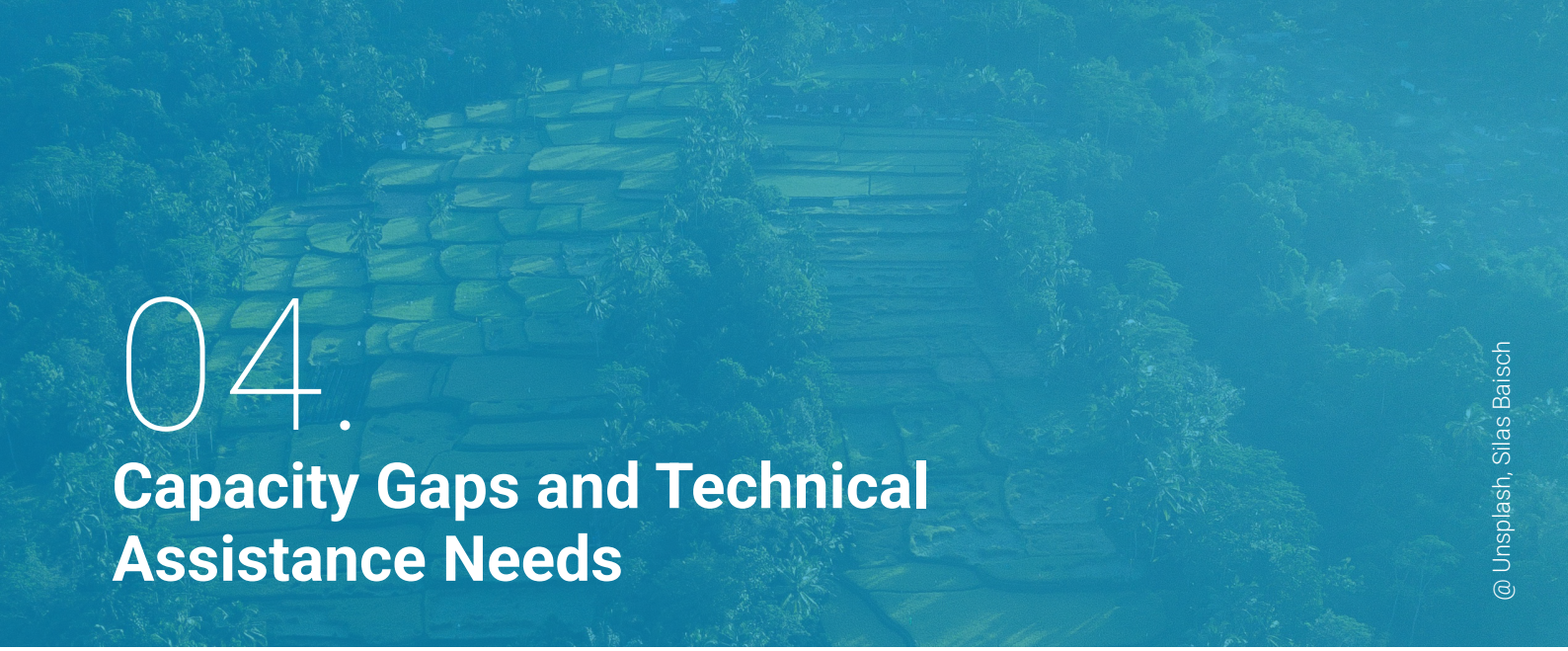
Generic alignment between Technical and Vocational Education and Training (TVET) programmes and industry needs is insufficient to secure local workforce participation in large-scale renewable energy projects. Evidence from the **Southeast Asia Energy Transition Partnership (ETP) SWIFT** project (*Specialised Workforce for Indonesia's Future Transition in Energy Roadmap 2025–2060*), implemented with PPSDM KEBTKE under the Ministry of Energy and Mineral Resources (MEMR), highlights the importance of accredited certification pathways. MEMR projects that Indonesia's clean energy transition could generate approximately 1.26 million jobs by 2060, across three implementation phases: 2025–2030, 2031–2045, and 2046–2060. However, without recognised professional certification, local workers are often excluded from higher-value Engineering, Procurement and Construction (EPC) positions and remain concentrated in lower-skilled operations and maintenance roles.

Addressing this challenge requires strengthening three interlinked national instruments. First, the Indonesian National Work Competency Standards (SKKNI) establish occupational competency requirements. Second, the National Professional Certification Board (BNSP) and MEMR issue nationally recognised Certificates of Competence (COCs) for renewable energy and energy efficiency professions. Third, accredited Sectoral Professional Certification Bodies provide the training, assessment, and certification services required to meet these standards.

For South Sulawesi, the priority is therefore not simply expanding TVET provision but ensuring that provincial training institutions including PNUP and UNM are integrated into BNSP or MEMR accredited certification pathways ahead of future procurement cycles. Establishing these certification pipelines before the next round of utility-scale wind, solar, and floating solar EPC tenders will be critical to enabling local workers to compete for skilled positions and increasing the proportion of project value retained within the province.

Evidence from broader Indonesian experience illustrates this dynamic. Rooftop solar PV has emerged as one of the most widely adopted renewable energy technologies because it encounters fewer technical and institutional barriers than larger generation projects. For example, provinces such as Bali have actively supported rooftop deployment through local incentives and planning instruments aligned with regional priorities (See SISET toolkit module 5 elaborating on lessons from other provinces). At the same time, national regulations and utility practices continue to shape the pace and scale of adoption through quota mechanisms and planning controls (Setyowati and Quist, 2022). Smaller and ancillary installations such as residential and commercial rooftop systems are generally easier to accommodate within the electricity system, whereas larger distributed generation projects raise concerns related to grid balancing, demand management, and utility revenues. This illustrates a broader challenge in Indonesia's transition: distributed renewable energy can expand and support local development objectives, but its integration needs to take into consideration the operational and financial realities of a centrally planned electricity system, particularly with the dominance of PLN.

The next section examines coordination and integration challenges in renewable energy planning at the provincial level, with a particular focus on the limited autonomy of subnational governments despite formal planning mandates under RUED and RUKD. It highlights persistent structural constraints including financing limitations, fragmented coordination mechanisms, and centralised decision-making that hinder effective alignment between national utilities, provincial agencies, and local development priorities.



04. Capacity Gaps and Technical Assistance Needs

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4.1 Provincial Coordination and Synchronisation Challenges in Renewable Energy Planning

Drawing on findings from the baseline assessment, technical missions, stakeholder consultations, and capacity-building activities conducted throughout the project, the next sections outline the key capacity gaps and technical assistance needs identified at the provincial level.

The discussion is organised around three interrelated dimensions: (i) institutional and governance capacity gaps (Section 4.1), coordination and synchronisation challenges in renewable energy planning (Section 4.2); and (iii) financial and economic capacity gaps (Section 4.3). Together, these findings provide an overview of the areas where further support, capacity development, and institutional strengthening may be required to advance renewable energy planning and implementation.

Through its engagement with stakeholders in South Sulawesi the SISET project has consistently found that provincial and local governments have limited autonomy in renewable energy planning and project implementation.[15]

Despite the intention of RUED and RUKD to empower provincial authorities, significant challenges, such as budget constraints, fragmented coordination frameworks, and centralised decision-making processes, still need to be addressed (See SISET toolkit module 6, outlining the capacity gaps and technical assistance needs for renewable energy transition). While Presidential Regulation No. 11/2023 allows provincial governments to contribute to remote area electrification using renewable energy, limited resources and regulatory challenges have restricted its effectiveness. Additionally, coordination among provincial agencies and national entities such as PLN is sporadic, often needing a structured mechanism to align energy planning with local socio-economic needs (see SISET toolkit, module 7, providing examples of Regional Energy Forums, as coordination platforms in strengthening collaboration across agencies and stakeholders in advancing renewable energy and energy transition initiatives.).

These coordination challenges are further reinforced by a disconnect between provincial development plans (RPJMD) and energy plans (RUED) (See Box 5). Although RPJMD frameworks are intended to position energy as a driver of economic growth and sustainability, energy considerations are not consistently embedded within broader development strategies. Moreover, both RUED and RPJMD have not effectively integrated key socio-economic dimensions of the energy transition, including workforce development, gender and social inclusion, and poverty reduction. This limits the extent to which renewable energy investments can generate broader development co-benefits, such as job creation, inclusive growth, and local industrial development, underscoring the need for stronger coordination and a more integrated socio-economic approach.

15 Debrief memo, Capacity building SISET toolkit workshop in Makassar, (21-22 April 2026).
Debrief memo, Knowledge Sharing and Capacity Building Workshop in Makassar: Energy Transition and Renewable Energy for Socio-Economic Development (17-19 June 2025),
SISET, policy paper, Recommendations for synchronizing inclusive and sustainable socio-economic benefits in the draft of the South Sulawesi RPJMD 2025–2029 (February 2025),
SISET baseline analysis report, summary for policymakers, October 2024.

Box 5
Regional Energy Forum, a case of West Java

The West Java Energy Forum is one of the more successful, multi-stakeholder initiative in Indonesia, led by the provincial government to accelerate the regional energy transition and strengthen green investment. It brings together local policymakers, civil society, academia, and international investors to translate national climate goals into actionable subnational programmes. West Java has institutionalised the Regional Energy Forum (Forum Energi Daerah) as a formal coordination mechanism across government and non-government actors.[16]

The Forum was officially established under Governor Decree No. 31/Kep-9/DESDM/2023, signalling a clear institutional and political commitment to embedding cross-sectoral coordination within the province's energy governance architecture. The Forum brings together 26 provincial agencies, 28 regency-level development planning agencies (Bappeda), six state-owned energy enterprises, five provincial state-owned enterprises, six academic institutions, 13 professional associations, and six representatives from civil society and other organisations. It was designed to facilitate cross-sectoral dialogue on strategic energy issues and to provide structured inputs into provincial energy planning, including the RUED and national energy policy processes.

In terms of synchronisation, RUED–RPJMD alignment largely operates as a vertical planning exercise, whereas renewable energy mainstreaming depends on horizontal institutional integration across provincial agencies. This requires internalisation of renewable energy priorities within sectoral and non-sectoral agencies (Organisasi Perangkat Daerah–OPD) mandates through Renstra(s), their operationalisation through Renja(s), and their translation into Regional Budget (APBD) allocations. While provinces often succeed in incorporating renewable energy into RUED and reflecting it at a rhetorical level in RPJMDs, implementation gaps remain significant. At the five-year planning level, Sectoral Agency Renstra documents rarely internalise renewable energy targets, resulting in weak sectoral ownership. At the annual level, Renja coordination is sometimes strengthened through regional energy forums but remains limited in scope (See SISET toolkit, module 2). At the budgeting level, APBD allocations frequently fail to support planned activities, constraining implementation.

Overall, the SISET project observes that progress in renewable energy governance depends less on the presence of plans or isolated projects and more on the extent to which political intent is institutionalised across planning and budgeting systems (see SISET toolkit, module 5). For comparison, in provinces such as Central Java, Yogyakarta, and Bali, high-level political endorsement has been critical in embedding energy transition priorities early in the planning process, enabling Bappeda to incorporate these priorities into RPJMD technocratic drafts. Without this anchoring, proposals from ESDM agencies often remain aspirational and are not adopted. These observations highlight that political will, reflected in sustained commitment from governors and senior leadership, plays a decisive role, particularly where renewable energy is framed not only as a technical sectoral issue but as part of a broader cross-sectoral development agenda.



@ SISET toolkit workshop

16 Debrief memo, Capacity building SISET toolkit workshop in Makassar, (21-22 April 2026).



4.2 Institutional and Governance Capacity Gaps

4.2.1 Connecting development priorities and energy planning

While national energy frameworks such as the KEN, RUEN, and RUPTL provide an overarching strategic foundation, their integration with development planning remains fragmented across governance levels. In practice, weak institutional linkages persist between national development objectives and energy policy, as well as in their vertical translation into subnational instruments such as RUED, RPJMD, RUKD, and sectoral Renstra. This misalignment operates at multiple levels: a disconnect between national development and energy goals, inconsistent translation from national to provincial and district planning, and horizontal fragmentation between local development plans (RPJMD) and energy plans (RUED). Consequently, energy targets are often insufficiently anchored in local development priorities and are not consistently matched with corresponding budget allocations for implementation.

At the provincial level, energy planning frequently operates in parallel to, rather than as part of, broader development strategies. The RUED tends to insufficiently capture energy demand across key productive sectors such as agriculture, fisheries, and transport, while the RPJMD continues to treat energy primarily as a standalone infrastructure issue rather than as a driver of structural economic transformation. Although many of these sectors are energy intensive and well suited to decentralised renewable energy solutions, provincial planning frameworks underutilise their potential to enhance productivity, value addition, and inclusive employment, while continued reliance on diesel-based systems remains prevalent in practice.

Box 6

Renewable Energy as a Driver of Inclusive Economic Participation

Renewable energy interventions can support social inclusion objectives. Examples include women-led fish processing enterprises that utilise renewable energy technologies and targeted training approaches designed to increase women's participation in technical and entrepreneurial roles. In Mata Redi and Mata Woga, Central Sumba: Ten local operators received certification in solar PV operation and maintenance, building sustainable technical capacity. Women's leadership proved transformative: 15 of 16 new businesses are women-led, demonstrating how involving women champions lead to stronger socio-economic outcomes in rural communities (Solagratia et al., 2024).

The SISET analysis identifies spatial planning and coordination gaps as barriers to aligning renewable energy development with subnational economic priorities. This disconnect is reflected in provincial spatial planning, where limited integration between renewable energy potential, industrial demand, and development priorities constrains the translation of resource availability into investable opportunities. Renewable energy development has not yet been fully embedded within provincial spatial plans (RTRW), and potential renewable energy sites are often not clearly designated. As large-scale renewable energy projects are increasingly driven through national initiatives, including National Strategic Projects (PSN), spatial planning processes must be better aligned with identified renewable energy development areas. Without such alignment, projects may overlap with agricultural land, forest areas, and coastal livelihoods, creating land-use conflicts, regulatory uncertainty, and implementation delays. The absence of spatially explicit energy planning therefore limits investment certainty while complicating efforts to balance renewable energy expansion with existing land-based economic activities.

UNOPS, ETP industrial decarbonisation assessment provides a practical mechanism for addressing this coordination challenge by linking renewable energy deployment with industrial decarbonisation opportunities in South Sulawesi (UNOPS, 2025b). The study identifies the non-metallic minerals sector as contributing approximately 10% of South Sulawesi's Gross Value Added (GVA) and proposes aligning renewable energy resource mapping with industrial demand centres. Specifically, it recommends that the provincial Dinas ESDM map renewable energy potential near industrial clusters, submit relevant data to Pusdatin ESDM (Centre for Data and Information, Ministry of Energy and Mineral Resources), and integrate the information into the ESDM OneMap platform to support coordinated planning and investment decisions. The SISET findings align with this approach, highlighting the subnational governance arrangements required to operationalise such mechanisms, including strengthened coordination among Dinas ESDM, provincial planning agencies, industrial stakeholders, and national-level data platforms.

A further structural gap is evident in the treatment of strategic resources, particularly critical minerals. Despite Indonesia holding some of the world's largest nickel reserves, these assets remain weakly integrated into subnational planning frameworks such as RUED and RPJMD. While national down streaming policies have stimulated industrial processing capacity, including coal-linked value chains, the lack of alignment at provincial level limits opportunities to translate this resource endowment into local value creation, employment generation, and multidimensional poverty reduction. As a result, the global energy transition's growing reliance on Indonesian nickel is not yet effectively leveraged to generate targeted regional development benefits or inform dedicated subnational investment planning and budgeting.

A critical issue for South Sulawesi's energy transition is the rapidly increasing electricity demand associated with industrial down streaming, particularly nickel processing and smelting. While provincial RE targets are being advanced, the growing role of industrial demand reflected in the RUPTL raises important questions about the future composition of the power mix. In practice, a significant share of smelter electricity demand is currently supplied by coal-fired captive power plants, creating a structural challenge for decarbonisation efforts. The expansion of captive coal generation risks offsetting renewable energy gains and reducing the effective contribution of RE within the province's overall energy mix (Faliana, 2025). The transition discussion therefore needs to move beyond increasing RE supply alone and address how RE can be integrated into the rapidly expanding private industrial power landscape. This is particularly important given the scale of nickel down streaming and its associated environmental and social impacts, including land-use pressures, water constraints, and community conflicts observed in industrial zones such as Morowali and Weda Bay. Across Indonesia, captive coal capacity has expanded rapidly alongside mineral processing industries, with implications for emissions reductions and the credibility of energy transition pathways (Hasan & Hummer, 2024). Separating renewable energy planning from the province's largest industrial energy demand drivers risks creating an incomplete transition pathway. A socially inclusive energy transition framework should therefore examine how industrial demand can become a catalyst for accelerated RE deployment, including through stronger planning requirements, incentives, and mechanisms to integrate RE into future industrial power supply.

Finally, there is a persistent gap in linking RE targets with broader climate commitments, social equity objectives, co-benefits, and international financing mechanisms (See Table 2). Renewable energy planning remains largely disconnected from climate mitigation strategies and local development priorities, despite clear entry points for alignment with the Sustainable Development Goals (SDGs), the Green Development Index, and national net-zero targets. This fragmentation limits the potential for mainstreaming energy as a cross-sectoral development enabler, resulting instead in its treatment as a narrowly defined infrastructure agenda rather than as a central pillar of integrated, inclusive, and climate-aligned regional development (see SISET toolkit module 2).

Table 2
Opportunities for Cross-Sectoral energy and development synergy

Sector	Agriculture	Fisheries	Animal Husbandry	Industry	Transport
Example of RE uses / activities	› Solar-powered irrigation and agro-processing › Cold storage powered by solar › Bioenergy from agricultural waste	› Solar-powered cold storage for fish preservation › Solar-powered ice-making machines › Solar-powered aerators for aquaculture › Solar/hybrid systems for small-scale fish processing units	› Biogas digesters using livestock waste (e.g., cow/buffalo manure) › Solar-powered water pumps for livestock drinking water › Solar-powered ventilation and lighting for barns › Hybrid RE systems for small-scale dairy processing or feed production	› Rooftop solar PV for small and medium industrie. › Solar-powered or hybrid RE systems for drying, milling, cooling, or heating processes. › Biomass/biogas systems using agricultural residues. › Energy efficiency and energy management improvements for SMEs. › Identification of RE potential for larger-scale captive power options in industrial zones.	› Electric two-wheelers and three-wheelers for urban logistics and deliveries. › Electric buses for BRT corridors and city transport. › Solar-powered charging public stations. › Integration of RE into port operations (shore power, cold storage). › Hybrid solar–battery systems for small fishing or river transport vessels.
Key benefits	› Lower irrigation cost › Reduced post-harvest loss › Higher crop productivity › Stable cold-chain for perishables › Increased rural income.	› Reduced spoilage › Higher hygiene and ice reliability › Lower diesel dependency › Improved coastal value-chain competitiveness	› Lower feed/water pumping cost › Reduced methane › Cleaner barns › Stable dairy cooling › Improved livestock health	› Lower energy cost › Higher process reliability › Cleaner production › Reduced waste heat › Improved product standards	› Lower fuel cost › Cleaner air › Reliable cold-chain mobility › Safer logistics › Improved port/terminal efficiency

Table 2 Continuation ▶

◀ Table 2 Continuation

Sector	Agriculture	Fisheries	Animal Husbandry	Industry	Transport
Foreseen cross-cutting thematic coordination (applies to all sectors)	**Energy (technical coordination)** › Alignment between ESDM and productive sectors on RE technical standards (solar pumps, cold-chain, biogas, EV charging). › Joint O&M guidelines & troubleshooting support for small-scale RE systems. › Coordination with PLN for hybrid / mini-grid readiness where needed. › Development of monitoring systems for the utilization and performance of renewable energy technologies to support program evaluation and cross-sectoral learning. **Environment** › Integration renewable energy development with regional climate change mitigation and environmental management programs. › Utilization renewable energy to support regional greenhouse gas emissions reduction efforts. **Education & Workforce** › Integration of RE O&M and safety modules into TVET, vocational schools, and polytechnics. › Joint technician certification (PV, biogas, solar pumps, cold-chain, EV). › Co-financing via education/skills budgets, not solely energy budgets. › Sector–education alignment so skills match deployment scale and locations. **Gender & Inclusivity** › Inclusion of youth and women groups in RE O&M and productive-use training. › RE services designed to reduce labour burden and improve income control (solar dryers, cold storage, EV fleets, biogas processing). › Women-only cohorts to increase retention in technical roles. › Outreach, assessments, and oversight on the socioeconomic impacts of renewable energy programs implemented by other OPDs. **Local governance** › Village Funds & BUMDes used for service-based O&M models (solar pumps, cold storage, EV charging). › Legal alignment for village-level RE budget allocation. › Regency governments integrate RE in RPJMD/Renstra. › Clear ownership setup: village-owned RE assets, community-managed O&M. **MSMEs & Cooperatives** › Cooperative-based RE productive hubs (drying, cold-chain, dairy processing) › Government MSME upgrading schemes include RE productivity budgets › Development of renewable energy financing schemes for productive sectors through collaboration between local governments, regional banks, and financing institutions. **Spatial planning** › Sectoral-RE siting reflected in RTRW/RDTR › Prevents land-use conflicts and accelerates deployment through clear permitting. › Ensures climate-responsive land allocation linked with food supply, coastal resilience, and rural logistics.				

Table 2 Continuation ▶

Table 2 Continuation

Sector	Agriculture	Fisheries	Animal Husbandry	Industry	Transport
Cross-cutting development impacts (applies to all sectors, entry points for alignment with regional planning)	**Energy** › Improved reliability and uptime of small-scale RE systems. › Reduced diesel dependency and operational costs across productive sectors. › Lower energy costs for production activities in productive sectors. **Environment** › Reduced cumulative and annual greenhouse gas (GHG) emissions › Improved Environmental Quality Index › Reduction of local air pollution. **Education & Workforce** › Increase in the number of locally certified workers in renewable energy technologies. › Higher absorption of vocational education graduates into energy-related jobs or productive sectors utilizing renewable energy. › Strengthened alignment between vocational education curricula and skill demands in the regional energy and productive sectors. **Gender & Inclusivity** › Increased participation of women and youth in technical training and renewable energy–based economic activities. › Growth in income from enterprises managed by women's groups or vulnerable groups through the use of renewable energy technologies. › Greater involvement of women in technical roles, business management, or decision-making within energy-based economic activities. › Availability of data and learning on the social and economic impacts of renewable energy utilization to support more inclusive regional policy planning. **Local governance** › Increase in the number of renewable energy systems sustainably managed by villages, village-owned enterprises (BUMDes), or community groups. › Establishment of clear asset ownership, operation, and maintenance mechanisms for renewable energy systems at the village or community level. › Improved coordination between local governments and village governments in planning and utilizing renewable energy for productive activities. **MSMEs & Cooperatives** › Improved productivity and product quality of MSMEs using renewable energy technologies. › Reduced energy operational costs for MSMEs and agro-processing or fisheries processing businesses. › Increased production volume or value addition for MSME products utilizing renewable energy technologies. › Expanded access of MSMEs to financing schemes for renewable energy technology investments. **Spatial planning** › Integration of renewable energy development sites into spatial plans (RTRW and RDTR) to support sectoral economic activities. › Reduced land-use conflicts through clearer spatial allocation for energy infrastructure and productive activities. › Improved rural logistics efficiency and distribution of production outputs through more reliable energy availability.				

4.3 Financial and Economic Capacity Gaps

Financing remains a core structural constraint to scaling renewable energy at the subnational level, shaped by politically cyclical, highly centralised, and often unpredictable funding arrangements that are poorly suited to long-term transition planning. Renewable energy and related infrastructure investments continue to rely heavily on central government allocations, leaving provincial and local authorities with limited fiscal autonomy to prioritise and sustain locally relevant energy initiatives. At the same time, subnational energy financing is influenced by shifting political priorities at the provincial level, where budget commitments often reflect electoral cycles and leadership agendas, resulting in discontinuities across planning periods and weakening overall policy stability. These challenges are further compounded by competing development pressures, as public expenditure is frequently reallocated toward immediate priorities such as health, education, and basic infrastructure, often at the expense of longer-term investments in workforce development and skills systems required to support the energy transition. Moreover, since 2025, nationwide government budget reductions have affected all sectors, resulting in decreased funding and lower prioritization of the energy sector. Collectively, these dynamics reduce financing certainty, weaken institutional learning, and limit the sustained scaling of renewable energy and its broader development co-benefits.

This challenge is evident by the fiscal planning gap between energy strategies and sectoral budgeting processes. Although Presidential Regulation No. 11/2023 formally enables provinces to allocate budgets for renewable energy, in practice it has not resolved the persistent disconnect between regional energy plans (RUED) and actual fiscal instruments within the Regional Budget (APBD). Renewable energy priorities identified in RUED are rarely translated into dedicated, multi-year budget lines or systematically embedded within sectoral programming. This gap is particularly evident in productive sectors such as agriculture, fisheries, and workforce development, where the potential role of renewable energy is increasingly recognised at a conceptual level but seldom reflected in integrated or ring-fenced funding streams.

In addition, large-scale wind energy projects generate limited fiscal returns for local governments. Unlike geothermal and mining activities, which provide substantial revenue-sharing transfers to regional administrations, wind energy developments typically contribute only modest revenues through land and property taxes. As a result, local governments often receive relatively few direct economic benefits from renewable energy investments despite retaining important responsibilities for land-use planning, permitting, and project facilitation. This creates a misalignment of incentives that can weaken local government support for renewable energy deployment and reduce the momentum for accelerating energy transition efforts at the subnational level. As a result, strategic energy objectives remain weakly operationalised due to the absence of a coherent fiscal mechanism that secures and aligns budget allocations across sectors.

Beyond governance and coordination challenges, subnational governments in South Sulawesi often lack the technical, institutional, and financial capacity required to develop renewable energy projects that are bankable and attractive to investors. This represents a significant barrier to translating national energy transition objectives into locally driven and inclusive development outcomes. Key constraints include limited project origination and development skills, a persistent disconnect between planning and implementation, and financial limitations.

An important constraint to note is not only the availability of catalytic financing, but also the limited capacity of local institutions to originate and structure investable projects. Instruments such as viability gap funding (VGF) (See Box 8) and other blended finance mechanisms can help address financial barriers, but they cannot compensate for poorly structured projects, weak risk allocation, or inadequate preparation. Strengthening project origination capacity within provincial planning and energy agencies is therefore essential to ensure that emerging financing opportunities, including JETP-related resources, can support locally developed projects rather than bypass subnational institutions with limited project development capabilities.

Box 7
Unlocking Renewable Energy Investment through Viability Gap Funding

Titab Mini Hydro, Bali: The Viability Gap Fund (VGF) mechanism demonstrates how strategic capital grants can unlock commercial financing. UK government contributed IDR 2.6 billion (15% of CAPEX), enabling the project to access PT SMI financing and developer equity. This blended approach (grant + loan + equity) delivered a 1.4 MW plant serving 600 households. Overall, VGF support unlocked potential investment up to 10 times the VGF's cost, demonstrating the multiplier effect of strategic public funding (MENTARI Programme. *Viability Gap Fund and demonstration projects* (Mata Redi and Mata Woga, East Nusa Tenggara). Muara Enggelam and Mata Redi: BUMDes and cooperatives collect tariffs and reinvest surplus into maintenance and productive use, sustaining operations independently (Solagratia et al., 2024).

In practice, the RPJMD formulation process serves as the primary mechanism for aligning institutional mandates, development priorities, and budget allocations. However, sustained energy transition outcomes require full integration between the RUED and RPJMD, a level of alignment that has yet to be achieved in any province. As a result, implementation continues to depend heavily on annual discretionary APBD allocations. While this approach provides short-term flexibility, it offers limited certainty and continuity, particularly in periods of fiscal constraint or changing political priorities.

Ultimately, the resilience of renewable energy programming depends on whether it is formally embedded within OPD Renstra performance frameworks and explicitly linked to RPJMD outcomes. Without this institutional and fiscal anchoring, renewable energy initiatives remain exposed to fragmentation, funding volatility, and changing administrative priorities (see SISET toolkit module 2, on understanding the sectoral planning framework, where OPDs translates regional development priorities into a layered planning structure that moves from strategic intent to operational execution)[17]. Moreover, while regional energy plans (RUED) and medium-term development plans (RPJMD) frequently establish ambitious renewable energy targets, these are often not translated into a pipeline of concrete, investment-ready projects. Addressing these constraints will require targeted capacity building for project origination and preparation, institutional strengthening, and enhanced support for project development, financing, and investment facilitation.



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17 Local government planning follows a hierarchical structure regulated by national frameworks, particularly: MoHA Regulation No. 86/2017, which regulates regional development planning procedures; MoHA Regulation No. 90/2019, which standardizes program and activity nomenclature; and is operationalized through the Regional Government Information System (SIPD).



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05. Key Lessons for policymakers and development partners

a. Align energy with development planning and budgets

- Integrate RUED priorities into RPJMD, sectoral plans, and APBD
- Position renewable energy as a driver of sector outcomes (agriculture, fisheries, MSMEs), not a standalone target
- Recognise that cross-sectoral budgeting is constrained by national nomenclature (Permendagri No. 90/2019, SIPD) and sustained progress requires MoHA/MoF-level reform alongside sub-national advocacy, not sub-national effort alone

b. Embed renewable energy in productive sectors and local economies

- Integrate renewable energy into agriculture, fisheries, and MSME programmes (e.g. irrigation, cold storage, processing)
- Use sector budgets, not only energy budgets, to finance these applications, while building the pipeline of investible projects needed to draw in PLN and private finance
- Treat industrial energy demand including for nickel down streaming as a catalyst to fast-track utility-scale RE and captive RE, not a parallel track to renewable energy planning

c. Strengthen implementation capacity and sustainability

- Build capacity in planning, data, and project execution at subnational level
- Establish clear ownership and O&M models (e.g. BUMDes, cooperatives), while addressing the historically high failure rate of decentralized systems (due to lack of attention to O&M) through realistic public-private-community operating models
- Formalise coordination mechanisms early, informal working groups are a useful starting point but should have an explicit pathway to a Governor's Decree (as with Forum Energi Daerah) to outlast project cycles
- Align skills development (TVET) with accredited certification pathways (SKKNI/BNSP) to capture higher-value jobs
- Strengthen local capacity to originate bankable projects through targeted project development support, institutional capacity building, and investment facilitation.

Lessons from South Sulawesi show that renewable energy deployment alone does not automatically translate into broader development outcomes. The transition is more likely to be inclusive and economically transformative when it is effectively integrated into planning systems, embedded within sectoral priorities, and supported by coordinated institutions and adequate financing. When these conditions are in place, renewable energy presents a significant opportunity for economic development, industrial transformation, workforce development, energy security, and social inclusion. Subnational governments play a central role in enabling this shift. Strengthening their capacity, mandate, and coordination mechanisms will be important for enhancing the extent to which Indonesia's energy transition can contribute to both climate and development objectives.

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