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Renewable Energy Development Toward Sustainable Development Goals in Vietnam: Status, Constraints, and Policy Implications

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ABSTRACT: This paper examines how renewable energy development can advance sustainable development in Vietnam by strengthening energy security, reducing greenhouse-gas emissions, and generating wider economic and social co-benefits. The study uses a qualitative desk-review method and triangulates recent official policy documents, sector statistics, and international analytical reports. The evidence shows that Vietnam has moved from ad hoc incentives toward a more structured transition framework through the 2022 NDC update, the 2024 Electricity Law, Decree No. 58/2025/ND-CP, and the revised Power Development Plan VIII together with its implementation plan. By 2024, the national power system reached 82,387 MW of installed capacity, of which renewable energy excluding hydropower accounted for 21,447 MW, while total power production and purchases reached 308,732 million kWh and renewable generation reached 39,641 million kWh. Household electrification reached 99.83%, indicating that the policy challenge has shifted from access expansion to system decarbonization and flexibility. Vietnam also has substantial renewable potential beyond hydropower, particularly in wind, solar, and marine energy such as wave resources, but these resources are still not being exploited efficiently. Nevertheless, transmission constraints, storage needs, human-resource shortages, infrastructure gaps, financing risks, technology limitations, and uneven implementation remain major bottlenecks. The paper concludes that Vietnam can use renewable energy as a lever for SDG 7, SDG 8, SDG 9, and SDG 13 if future policy prioritizes grid expansion, bankable market rules, stronger domestic capabilities in finance, infrastructure, technology, and skills, and a just transition approach.

I. INTRODUCTION

Renewable energy development has become a strategic rather than merely technical issue for emerging economies because it influences energy security, industrial competitiveness, and climate policy (World Bank, 2025). It is also increasingly linked to public health because cleaner power systems can reduce exposure to air pollution (World Health Organization, 2026). Global labor-market evidence further suggests that renewable energy expansion can create new jobs and support greener structural transformation (International Labour Organization, 2024). For Vietnam, this strategic relevance is amplified by the fact that the country possesses considerable renewable potential beyond hydropower, especially wind, solar, and marine energy such as wave resources, yet these resources have not been exploited and used efficiently. These combined effects explain why renewable energy is now widely treated as a core pathway to sustainable development rather than a narrow electricity-sector reform (World Bank, 2025).

Vietnam's policy direction changed decisively at the 26th United Nations Climate Change Conference, where the Prime Minister announced the national goal of reaching net-zero emissions by 2050 (Prime Minister of Viet Nam, 2021). This commitment was subsequently operationalized in the country's updated Nationally Determined Contribution, which raised mitigation ambition for 2030 and assigned a major role to the energy sector (UNFCCC, 2022). In policy terms, renewable energy therefore sits at the center of Vietnam's effort to reconcile economic growth with decarbonization (UNFCCC, 2022).

The institutional architecture has also become more coherent. The 2024 Electricity Law created a clearer legal basis for renewable energy and new energy development (Ministry of Industry and Trade, 2024). Decree No. 58/2025/ND-CP then specified several implementation mechanisms under the new law (Government of Viet Nam, 2025). At the planning level, the revised Power Development Plan VIII redefined renewable energy as a strategic pillar of future system expansion (Ministry of Industry and Trade, 2025a). The associated implementation plan further translated that strategic orientation into concrete assignments and milestones (Ministry of Industry and Trade, 2025b).

Against this background, this paper asks three questions: What progress has Vietnam made in scaling renewable energy? What constraints continue to hinder sustainable deployment? And which policy priorities matter most for the period 2026-2030? The aim is to provide an integrated assessment of renewable energy development as both an electricity-sector transition and a broader sustainable-development strategy.

II. METHOD

This study uses a qualitative desk-review design supported by descriptive analysis of official sector statistics. The approach is appropriate because the paper focuses on institutional change, implementation progress, and policy implications rather than on econometric estimation. Official power-sector statistics were drawn primarily from EVN's latest annual report (Vietnam Electricity, 2026).

The study also draws on Vietnam's NDC update, the Electricity Law, the revised Power Development Plan VIII, and its implementation plan to interpret policy evolution (UNFCCC, 2022). International analytical reports were used to contextualize domestic developments in relation to energy transition, employment, and public-health debates (World Bank, 2025). The findings were synthesized through comparative reading and thematic analysis.

III. RESULTS

3.1. Policy and institutional progress

Recent reforms suggest that Vietnam has moved from fragmented incentive-based expansion toward a more rule-based transition framework (Ministry of Industry and Trade, 2024). The 2024 Electricity Law formally recognizes renewable and new energy within the national legal framework (Ministry of Industry and Trade, 2024). Decree No. 58/2025/ND-CP provides more detailed rules for implementation (Government of Viet Nam, 2025). The revised Power Development Plan VIII sets the strategic direction for source and grid development (Ministry of Industry and Trade, 2025a). The implementation plan allocates responsibilities and milestones for delivery (Ministry of Industry and Trade, 2025b).

Table 1: Key policy milestones shaping Vietnam's renewable energy transition

Year	Policy instrument	Main relevance
2021	COP26 net-zero pledge	Established the long-term strategic direction for a low-carbon energy transition.
2022	Vietnam NDC 2022 Update	Raised 2030 mitigation ambition and strengthened the energy sector's role in emissions reduction.
2024	Electricity Law No. 61/2024/QH15	Created a clearer legal basis for renewable energy and new energy development.
2025	Decree No. 58/2025/ND-CP	Provided implementing rules for parts of the Electricity Law relating to renewable and new energy.
2025	Revised Power Development Plan VIII	Expanded targets for solar, wind, storage, and flexible resources; linked source growth with system planning.
2025	Decision No. 1509/QD-BCT	Specified the implementation roadmap and institutional responsibilities for the revised PDP VIII.

Source: *Compiled by the authors from official documents listed in the References.*

This policy layering matters for at least two reasons. First, it narrows the gap between long-term climate ambition and sector-specific regulation (UNFCCC, 2022). Second, it expands the meaning of renewable energy from a supplementary source of electricity to a platform for industrial development, innovation, and decarbonization (Ministry of Industry and Trade, 2025a). In that sense, renewable energy policy now serves both environmental and development objectives in Vietnam (World Bank, 2025).

3.2. Current deployment and system performance

EVN's most recent system-wide data show that Vietnam has already built a substantial renewable base (Vietnam Electricity, 2026). In 2024, installed capacity reached 82,387 MW, including 21,447 MW of renewable energy excluding hydropower and 23,664 MW of hydropower (Vietnam Electricity, 2026). Total electricity production and purchases reached 308,732 million kWh, of which 39,641 million kWh came from non-hydro renewable sources (Vietnam Electricity, 2026). These figures indicate that renewable energy has moved beyond a pilot role and now constitutes a meaningful part of national power supply (Vietnam Electricity, 2026).

Vietnam also maintained 99.83% household electrification in 2024 (Vietnam Electricity, 2026). This suggests that the country's principal electricity challenge is no longer basic access, but how to decarbonize a rapidly growing system while preserving reliability (Vietnam Electricity, 2026). At the same time, current deployment still captures only part of Vietnam's wider renewable-resource endowment beyond hydropower, particularly in wind, solar, and marine energy such as wave resources, which remain underutilized. The gap between the share of non-hydro renewables in installed capacity and their share in generation also highlights the importance of system flexibility and dispatch conditions (International Energy Agency, 2024).

Table 2: Selected indicators of Vietnam's renewable energy transition

Indicator	Value	Interpretation
Installed capacity (2024)	82,387 MW	Current scale of the national power system.
Renewable capacity, excluding hydropower (2024)	21,447 MW	About 26.0% of installed capacity.
Hydropower capacity (2024)	23,664 MW	Shows the continuing role of established low-carbon supply.
Total power production and purchases (2024)	308,732 million kWh	System-wide electricity output and purchases.
Renewable generation, excluding hydropower (2024)	39,641 million kWh	About 12.8% of total electricity supply.
Households with electricity (2024)	99.83%	Near-universal electricity access.
Solar power target (2030)	46,459-73,416 MW	Large planned expansion under the revised PDP VIII.
Onshore and nearshore wind target (2030)	26,066-38,029 MW	Major scale-up of variable renewable capacity.
Offshore wind for domestic demand	6,000 MW by 2030; 17,032 MW by 2035	Emerging strategic source and industrial opportunity.
Battery storage target (2030)	10,000-16,300 MW	Critical flexibility resource for renewable integration.

Source: *Compiled by the authors from EVN and Ministry of Industry and Trade documents listed in the References.*

Planned expansion remains ambitious. The revised Power Development Plan VIII targets 46,459-73,416 MW of solar power by 2030 (Ministry of Industry and Trade, 2025a). The same plan targets 26,066-38,029 MW of onshore and nearshore wind power and around 6,000 MW of offshore wind for domestic demand by 2030 (Ministry of Industry and Trade, 2025a). It also anticipates 10,000-16,300 MW of battery storage and a major increase in self-consumption rooftop solar (Ministry of Industry and Trade, 2025a). The subsequent implementation plan confirms that these targets are intended to guide coordinated action across ministries, provinces, and utilities (Ministry of Industry and Trade, 2025b).

3.3. Key constraints

Despite this progress, five structural bottlenecks remain. The first is grid readiness. The revised Power Development Plan VIII explicitly links renewable development to transmission expansion, storage deployment, and flexible operation (Ministry of Industry and Trade, 2025a). The second is broader resource constraints. Vietnam still faces shortages of skilled human resources, enabling infrastructure, affordable long-term capital, and technological capability for exploiting and developing renewable energy at scale. The third is implementation capacity, because ambitious targets do not automatically translate into bankable and operational projects (Ministry of Industry and Trade, 2025b). The fourth is financing predictability, which affects investor confidence and the pace of

project mobilization (World Bank, 2025). The fifth is the need to integrate distributed generation, especially rooftop solar, with wider electricity-saving efforts (Government of Viet Nam, 2026).

The International Energy Agency likewise concludes that a net-zero electricity pathway for Vietnam requires a system-wide transformation that combines renewable capacity expansion with energy efficiency, grids, storage, and more flexible market arrangements (International Energy Agency, 2024). This assessment suggests that the next phase of Vietnam's renewable transition will depend less on announcing new megawatts and more on creating the technical and institutional conditions that allow them to perform effectively (International Energy Agency, 2024).

IV. DISCUSSION

The evidence suggests that renewable energy can advance sustainable development in Vietnam through at least four pathways. First, it strengthens SDG 7 by supporting a cleaner electricity mix in a country that has already achieved near-universal access (Vietnam Electricity, 2026). Second, it contributes to SDG 8 by stimulating new investment and green employment opportunities (International Labour Organization, 2024). Third, it supports SDG 9 because the transition requires new infrastructure, storage, digitalization, and industrial capabilities (Ministry of Industry and Trade, 2025b). Fourth, it advances SDG 13 by lowering the carbon intensity of future power expansion and helping Vietnam implement its NDC commitments (UNFCCC, 2022).

However, the Vietnamese case also shows that installing renewable capacity does not automatically deliver sustainable development. The difference between the 26.0% share of non-hydro renewables in installed capacity and the lower share in annual generation indicates that capacity growth alone is not a sufficient performance indicator (Vietnam Electricity, 2026). System outcomes also depend on transmission availability, storage, dispatch flexibility, project bankability, and the availability of human, technological, and infrastructure resources needed to turn natural potential into usable power (International Energy Agency, 2024). For that reason, the success of future policy should be measured not only by approved megawatts but also by operating performance, curtailment reduction, emissions outcomes, efficient use of wind, solar, and marine resources, and domestic value creation (World Bank, 2025).

The broader economic case for renewables is also strong. The World Bank estimates that well-designed climate mitigation policies could raise Vietnam's real GDP by 4.4% in 2050 relative to a baseline scenario (World Bank, 2025). At the same time, the ILO reports that renewable energy employment worldwide reached 16.2 million jobs in 2023, underscoring the labor-market relevance of green industrial policy (International Labour Organization, 2024). Cleaner energy systems also matter for public health because air pollution remains a major global risk factor (World Health Organization, 2026). Taken together, these considerations suggest that renewable energy should be treated as a strategic development asset rather than only an environmental obligation (World Bank, 2025).

Policy should therefore move in five directions. First, grid and storage investment must be accelerated and sequenced with new renewable capacity (Ministry of Industry and Trade, 2025a). Second, market rules and financing mechanisms must become more predictable so projects can attract long-term capital on reasonable terms (World Bank, 2025). Third, supporting infrastructure, local manufacturing, engineering services, technological learning, and green skills should be developed so that the transition is not constrained by shortages of human resources, infrastructure, or technology (International Labour Organization, 2024). Fourth, distributed rooftop solar should be linked more closely with electricity-saving policy and local load management (Government of Viet Nam, 2026). Fifth, future transition policy should incorporate fairness and regional inclusion while making more effective use of Vietnam's underexploited wind, solar, and marine renewable potential so that the benefits and burdens of decarbonization are more evenly distributed (World Bank, 2025).

V. CONCLUSION

Renewable energy development has become one of the most important routes by which Vietnam can pursue sustainable development (World Bank, 2025). Vietnam has already established a stronger legal and planning framework through the Electricity Law, Decree No. 58/2025/ND-CP, and the revised Power Development Plan VIII (Ministry of Industry and Trade, 2024). The country has also built a significant renewable base within the power system and maintained near-universal electrification (Vietnam Electricity, 2026). At the same time, substantial renewable potential beyond hydropower, especially wind, solar, and marine resources, remains underutilized. These achievements and remaining gaps create a credible foundation for connecting energy transition with wider economic and social goals (UNFCCC, 2022).

For the period 2026-2030, success should be judged by whether Vietnam can convert renewable potential into reliable electricity, lower emissions, productive investment, and inclusive development outcomes (International Energy Agency, 2024). That outcome will depend on the practical alignment of planning, finance, grid expansion, storage, industrial capability, technological upgrading, human resources, and implementation capacity so that promising sources such as wind, solar, and marine energy can be exploited more effectively (World Bank, 2025).

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