REPORT

South Asia Energy Transition Status Report

JANUARY 2026

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Connections. Insights. Impact.

Publication information

South Asia Energy Transition Status Report

Published by: United Nations Office for Project Services (UNOPS)

Publication date: 13 May 2026

ISBN 978-624-4920-00-7

Suggested citation

UNOPS. 2026. South Asia Energy Transition Status Report. United Nations Office for Project Services. ISBN 978-624-4920-00-7

Table of Contents

Abbreviations

ADB: Asian Development Bank

AEPC: Alternative Energy Promotion Centre (Nepal)

AIIB: Asian Infrastructure Investment Bank

ARE: Alternative and Renewable Energy (Policy, Pakistan)

AT&C: aggregate technical and commercial (losses)

BEE: bureau of energy efficiency (India)

BERC: Bangladesh Energy Regulatory Commission

BESS: battery energy storage system

BIMSTEC: Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation

BPDB: Bangladesh Power Development Board

BPC: Bhutan Power Corporation

BPSO: Bhutan Power System Operator

CBET: cross-border electricity trade

CCDR: Country Climate and Development Report

CEB: Ceylon Electricity Board (Sri Lanka)

CERC: Central Electricity Regulatory Commission (India)

CNZ: carbon net zero

DER: distributed energy resources

DGPC: Druk Green Power Corporation (Bhutan)

DISCOM: distribution company (India, Pakistan, Sri Lanka)

DoE: Department of Energy (Bhutan)

DRR: disaster risk reduction

EE: energy efficiency

ERA: Electricity Regulatory Authority (Bhutan)

EV: electric vehicle

FDI: foreign direct investment

FENAKA: Fenaka Corporation Limited (Maldives)

GCF: Green Climate Fund

GDP: gross domestic product

GH2: green hydrogen

GHG: greenhouse gas

GIS: geographic information system

GoB: Government of Bangladesh

GoI: Government of India

GoM: Government of Maldives

GoN: Government of Nepal

GoP: Government of Pakistan

GoSL: Government of Sri Lanka

HVDC: high voltage direct current

IBRD: International Bank for Reconstruction and Development (World Bank)

IDCOL: Infrastructure Development Company Limited (Bangladesh)

IFC: International Finance Corporation

IFI: International Financial Institution

IEA: International Energy Agency

IEMP: Integrated Energy and Power Master Plan (Bangladesh)

INFF: Integrated National Financing Framework

IPP: Independent Power Producer

IPPAN: Independent Power Producers' Association of Nepal

IRENA: International Renewable Energy Agency

ISA: International Solar Alliance

ISTS: Inter-State Transmission System (India)

JETP: Just Energy Transition Partnership

LNG: liquefied natural gas

MCCPF: Maldives Climate Change Policy Framework

MDB: Multilateral Development Bank

MNRE: Ministry of New and Renewable Energy (India)

MoENR: Ministry of Energy and Natural Resources (Bhutan)

MoEWRI: Ministry of Energy, Water Resources and Irrigation (Nepal)

MoPEMR: Ministry of Power, Energy and Mineral Resources (Bangladesh)

MRV: monitoring, reporting, and verification

MSME: micro, small, and medium enterprises

NAP: National Adaptation Plan

NDC: Nationally Determined Contribution

NEA: Nepal Electricity Authority

NEPRA: National Electric Power Regulatory Authority (Pakistan)

NGO: Non-Governmental Organization

O&M: operations and maintenance

PFI: Private Financial Institution

PHS: pumped hydro storage

PLI: Production Linked Incentive (India)

PPP: Public–Private Partnership

PPA: Power Purchase Agreement

PUCSL: Public Utilities Commission of Sri Lanka

PV: photovoltaic

RE: renewable energy

REB: Rural Electrification Board (Bangladesh)

RTC: round-the-clock (renewable tenders, India)

SAARC: South Asian Association for Regional Cooperation

SAREP: South Asia Regional Energy Partnership (USAID)

SDG: Sustainable Development Goal

SDPI: Sustainable Development Policy Institute (Pakistan)

SECI: Solar Energy Corporation of India

SEforALL: Sustainable Energy for All

SREDA: Sustainable and Renewable Energy Development Authority (Bangladesh)

STELCO: State Electric Company Limited (Maldives)

TA: Technical Assistance

T&D: transmission and distribution

TVET: Technical and Vocational Education and Training

UNDP: United Nations Development Programme

UNEP: United Nations Environment Programme

UNCDF: United Nations Capital Development Fund

WB: World Bank

WtE: waste-to-energy

Acknowledgements

This report was prepared by Asia Clean Energy Partners, with guidance and inputs from the United Nations Office for Project Services (UNOPS) and Sustainable Energy for All (SEforALL).

The research was commissioned by UNOPS to inform the potential design of a regional South Asia Energy Transition Collaborative Platform—a joint initiative of the UNOPS South Asia Multi-Country Office (SAMCO) and SEforALL—aimed at supporting a just and equitable sustainable energy transition in Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka. As an initial research output, the *South Asia Energy Transition Status Report* is based on desk research and a situation analysis of national energy plans, nationally determined contributions (NDCs), net-zero commitments, and the key barriers and opportunities shaping the regional energy transition landscape.

Preliminary findings from the desk research were presented during two multi-stakeholder regional consultations held in November 2025, followed by technical discussions with national authorities across South Asia. We extend our sincere appreciation to the governments of Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka for their constructive engagement and valuable contributions, which have significantly enhanced the quality and accuracy of the report. Their support is gratefully acknowledged.

Foreword from UNOPS

South Asia is one of the most climate-vulnerable regions on earth, and yet it remains among the most underserved by the global clean energy transition. This contradiction carries real consequences. It is a challenge that demands coordinated, sustained, and principled response.

The region's energy transition is often characterized by its deficits: financing gaps, aging infrastructure, regulatory fragmentation, and uneven institutional capacity. Those constraints are real, and this report addresses them with rigor and candor. Yet the evidence also reveals considerable cause for confidence. Across the region, governments, utilities, and the private sector are demonstrating what is achievable — from cross-border power agreements forging new corridors of regional cooperation, to decentralized renewable solutions reaching communities long dependent on fossil fuels. The foundations for transformation exist. What is required is the architecture to build upon them with greater coherence, speed, and equity.

The South Asia Energy Transition Collaborative Platform represents a direct response to that need. Its purpose is not to replicate the technical assistance already provided by others, but to perform a complementary and distinct function: convening regional dialogue, standardizing frameworks and instruments, aligning donor finance, and ensuring that the principles of just transition are embedded in every dimension of implementation.

UNOPS is committed to fulfilling that role alongside SEforALL and our government partners across the region. This report is the analytical foundation on which that commitment rests, and it reflects the dedication of many stakeholders whose engagement has made it possible.

Charles Callanan
Director, South Asia Multi-Country Office
United Nations Office for Project Services (UNOPS)

Foreword from SEforALL

In South Asia – home to nearly a quarter of the world's population – rapid economic growth is driving an unprecedented demand for energy. Meanwhile, the region is one of the world's most vulnerable to climate change, especially extreme heat. Efficient and resilient energy systems are critical to keeping people safe and economies thriving. While South Asian countries are making great strides with their energy transitions, persistent financing gaps are a major constraint and risk certain populations being left behind.

As highlighted in the South Asia Energy Transition Status Report, the region is brimming with political ambitions: from bold net-zero pledges to pioneering models for cross-border electricity trade to people-centred distributed solar programmes. South Asia has the necessary building blocks to provide access to affordable, reliable, sustainable and modern energy for all – in line with UN Sustainable Development Goal 7 and the Paris Agreement on climate change. However, translating these national commitments into bankable, scalable and equitable projects requires a new level of harmonization.

Sustainable Energy for All (SEforALL) recognizes that the energy transition in South Asia cannot be viewed solely through the lens of emissions reduction. It is a development imperative. The energy transition can empower micro, small and medium enterprises with reliable, distributed renewable energy. It can provide life-saving efficient cooling to communities facing extreme heatwaves. And it can ensure climate justice and prosperity for the most vulnerable populations.

This is where the South Asia Energy Transition Collaborative Platform adds unique value. While our partners at UNOPS bring unparalleled operational and implementation architecture, SEforALL brings a global ecosystem of best practices, frameworks and financial mobilization strategies to accelerate energy transitions. Through global mechanisms like UN Energy Compacts, the Mission Efficiency coalition on energy efficiency and the Global Cooling Pledge, we have seen firsthand how aligning public policy with private capital and international donor support can drastically accelerate progress.

This report highlights the need for a unified approach in South Asia that transcends borders. Together with UNOPS, regional governments and our development partners, SEforALL is committed to fostering a collaborative environment to turn the report into action, building a resilient and equitable energy future for South Asia.

Stefano Marguccio
Deputy CEO
Sustainable Energy for All (SEforALL)

Executive Summary

This scoping study offers a holistic view of the opportunities and challenges in shaping the energy transition in South Asia and identifies means to capitalize on in-country initiatives towards better effectiveness and regional sharing of best practices. The analysis, developed through a structured desk review, covers Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka. It maps the stakeholders, national policies and highlights regional trends, and considers cross-cutting themes such as just energy transition (ensuring vulnerable communities equitably share benefits), adopting nature-based solutions (NbS), and engaging in disaster risk reduction (DRR) of energy related infrastructure, in a changing climate.

The study does not prescribe interventions, but provides UNOPS, SEforALL, and potential partners with a clear picture of the current institutional landscape, persistent gaps, and potential leverage points where regional cooperation, synergy in technology adoption, and standardization across the region could add value without duplicating existing donor or government programs, while benefiting from knowledge sharing and blended financing. This diagnosis is critical because South Asia is a pivotal region: political ambition for clean energy is high along with the climate financing potential, yet the ability to translate ambition into bankable, resilient projects remains uneven. The study provides strategic recommendations for engagement, underscoring shared regulatory and financial challenges in the region and across countries. Regulatory frameworks for distributed energy resources, strategic storage options, and cross-border trade of energy and derivatives are still evolving; utilities face financial stress; and smaller markets rely heavily on concessional finance. At the same time, donor pipelines are active, rooftop solar and storage pilots demonstrate proof of concept, and hydropower resources could act not only as renewable and natural anchors but also provide storage for stabilizing power flows.

The Collaborative Platform has emphasized the need to integrate NbS and disaster resilience and transition into its framing while highlighting the potential use of Paris Agreement Article 6 and loss, green bonds and damage funds to enhance the sustainability of the transition. Our analysis shows that these are not peripheral issues, but central to the credibility and sustainability of a just transition. In Bangladesh and Sri Lanka, coastal NbS are already linked to renewable energy resilience; in Bhutan and Nepal, watershed management is directly tied to hydropower reliability; in the Maldives, hybrid mini-grids are designed with disaster preparedness in mind. Across the region, civil society and research institutions are pushing for inclusivity, gender responsiveness, and SME/MSME participation. These insights confirm that Platform's envisaged emphasis on climate prosperity and climate justice is well placed, and that future engagement should ensure these dimensions are embedded in any regional frameworks or toolkits it develops, including the support to green exports.

The Collaborative Platform will be based on the objectives and experience of the UN Secretary General's Sustainable Energy for All (SEforALL) global initiative and the successful operation of the Southeast Asia Energy Transition Partnership. As such, the Platform initiative has the potential to transfer multiple models and best practices, including financial and technology models from the global domain to South Asia. While a fuller treatment of SEforALL's role and the lessons from the Southeast Asia ETP will be developed, separately, this diagnostic notes their relevance as essential reference points for shaping the South Asia initiative and ensuring alignment with global and regional best practices.

The findings also highlight the value of a potential initiative positioning as a regional convenor and standard-setter. Rather than adding another layer of technical assistance, this regional initiative can help reduce transaction costs and accelerate implementation by publishing standardized templates for contracts, interconnection codes, reporting mechanisms, and safeguards; by coordinating donor finance windows to lower the cost of capital; and by aggregating demand for distributed solutions to achieve economies of scale. Equally, the initiative can provide a platform for operational exchanges, bringing regulators, utilities, and financiers together to share practical lessons on auctions, storage dispatch, distributed energy integration, and cross-border settlement.

This regional image is supported by country-specific analysis in relation to global developments in a changing climate. For example, Bangladesh requires predictable rules of wheeling and tariffs and better involvement of local banks; Bhutan should not rely only on hydropower but operationalize cross border trade; India's experience with auctions and storage integration offers replicable lessons; the Maldives must address island resilience; Pakistan must achieve consistency in regulations and financial discipline; and Sri Lanka can develop multiple transition pathways as a solution to fiscal stress. These cases are not the only possibilities but demonstrate that while contexts vary, the gaps are common - namely, regulatory clarity, system flexibility, information and knowledge management and affordable finance.

Importantly, the outcome of this diagnostic effort directly informs the next stage of the research: the development of a regional Concept Note & Strategic Operational Framework for the Collaborative Platform. The mapping of stakeholders, identification of leverage points, and integration of cross-cutting themes provide an evidence base upon which the strategy will be built. The insights from SEforALL, Southeast Asia ETP experience and others will help to highlight and clarify where the Collaborative Platform can add unique value, how it can align with national priorities while avoiding duplication, and how NbS, DRR, and just transition can be systematically embedded in its operating model.

During round table discussions, stakeholders highlighted that the proposed Platform would rely on (i) keeping in line with national MRV and data systems, and (ii) supporting demand-side actions, especially scaling up of renewable energy & energy efficiency measures under the current government policy targets, cooling, and building-sector actions. Consultations also highlighted that regulators should not be viewed as peripheral stakeholders (instead, as core counterparts) since they are key stakeholders in tariff design, grid-code enforcement, distributed energy integration, and cross-border settlement rules.

The report and the associated strategic approach cover diagnostics, current regional and global context that could add value and synergy towards the proposed Collaborative Platform for Energy Transition in South Asia. Accordingly, this report is not intended to stand alone but serves as the analytical foundation for the Collaborative Platform concept and framework, ensuring that UNOPS can ground its forthcoming strategy and proposed activities in regional realities and be responsive to national and donor expectations. By doing so, the proposed Collaborative Platform can accelerate the just energy transition, create employment, promote trade, and advance a vision of climate prosperity and climate justice that makes South Asia's energy systems cleaner, more resilient, equitable, and investable.

Key Takeaways

The following key takeaways from the above detailed executive summary can help to distill the most important findings of these diagnostic outcomes into a concise set of messages for UNOPS, SEforALL and partners. This diagnosis furnishes a brief account of the energy transition in South Asia. In Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka, there is high political ambition, but insufficient readiness. Four common themes emerged from these findings:

- **High ambition but uneven energy transition readiness**: All countries have NDCs and net-zero pledges, but institutional and regulatory maturity varies in the context of energy transition across the countries.
- **Financing gaps**: Though concessional finance flows dominate, domestic banks remain risk-averse for financing RE & EE projects and in many cases blended finance option or potential is underutilized.
- **Grid and system bottlenecks**: Ageing grid systems with persistent grid congestion associated with high T&D losses, and limited ancillary services constrain renewable integration.
- **Regional opportunity**: Hydropower in Nepal/Bhutan, solar in India/Bangladesh, and island hybrids in the Maldives/Sri Lanka can create natural complementarities for cross-border trade and resilience.

These findings reconfirm that a South Asia Energy Transition Collaborative Platform can bring value not through redundant duplication of donor programs, but through regional convening and setting of standards: publication of templates, alignment of donor finance, and fast-tracking the just transition, adoption of NbS, promoting resilience, and further facilitating the dialogue to enable cross-boarded power trade that can help robust energy planning and long-term sustainability.

1 Country Diagnostics

This section outlines the demographic, socio-economic, climate impacts, and energy sector key parameters and energy transition landscape of seven South Asian countries, namely, Bangladesh, Bhutan, India, Nepal, the Maldives, Pakistan, and Sri Lanka. This desk research highlights opportunities for UNOPS, SEforALL, and partners to support and facilitate the energy transition in the region.

Introduction to Country Profiles

To ensure an efficient, rapid diagnosis, this section presents the energy transition-related status of each country systematically based on the topics outlined below, through Tables 1 through 7:

- **Demographic data**, including current and projected population, electricity access, urbanisation levels, and overall energy demand.
- **Greenhouse gas (GHG) emission levels and key contributory sectors**
- **Socio-economic conditions** are illustrated using national and industrial GDP shares. In more industrialized countries like Bangladesh, India, Pakistan, and Sri Lanka, energy efficiency will be critical in decarbonizing to reduce emissions from high-emitting sectors.
- **Climate vulnerability, disaster resilience, climate prosperity and climate justice** reflect each country's climate risk exposure and how energy transition can enhance resilience and equity.
- **Relationship between energy transition and ecosystem sustainability**, and value of conservation in the long-term success of energy transition, and room for payment for ecosystem services in policy alignment
- **Policy drivers such as net-zero goals, coal phase-out plans, renewable energy targets, clean cooking and EV adoption targets**, as relevant, are highlighted alongside current progress to identify gaps and their underlying reasons.
- Finally, **key challenges and quick-win opportunities** where SEforALL and UNOPS along with partners can support the country's energy transition through the proposed regional initiative.

The pace and effectiveness of energy transition in South Asia is also being defined by the availability of finance/investments from domestic, donor, private sector and other sources, and the robustness and transparency of existing institutional frameworks and enabling environment at the country level. The Collaborative Platform design may improve the data availability and access, enabling environments for green investments, and enhance the interests of non-traditional donors such as impact investors, philanthropic sources, diaspora, etc.

In that context, the following country tables are expected to provide concise, insightful summaries aiming to articulate the current opportunities, potential innovations, and challenges to be addressed via the regional initiative to shape the South Asian energy transition while delivering multiple sector benefits and contributing towards UN SDGs.

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1.1 Bangladesh

Table 1: Bangladesh Country Diagnostic

Topic	Details
Demographic	Bangladesh's population is 172 million, projected to rise to 188 million by 2031 and 204 million by 2051. The working-age group (15–64 years) accounts for 67–68%, signaling higher energy demand from people and economic growth. As of 2023, 99.5% of the population had access to electricity, while 40% lived in urban areas, with this figure expected to surpass half the population in coming years.
Socio-Economic	GDP grew steadily, reaching USD 450 billion in 2024, with industry sector contributing USD 98 billion (21%).
GHG emission	The national GHG emissions in the baseline year 2022 totaled 268.02 $MtCO_2e$. The emissions by subsector were as follows: energy – 141.65 $MtCO_2e$ (52.85%), IPPU – 8.09 $MtCO_2e$ (3.01%), AFOLU – 91.21 $MtCO_2e$ (34.03%), and waste –27.07 $MtCO_2e$ (10.09%)[1]
Climate Vulnerability	Bangladesh ranks 9th globally for disaster risk (2nd of the region)[2] due to its high exposure and vulnerability. Floods pose the greatest threat, particularly to the central and northeast regions impacting energy infrastructure and limiting the land use for investing in solar farms. Bangladesh's National Adaptation Plan (2023–2050) estimates climate costs at $230 billion over the period.
Climate Policy	Nationally Determined Contributions 2.0 (2021)[3] Nationally Determined Contribution 3.0 (2025)[4] National Adaptation Plan 2023-2050 (2022) First Biennial Transparency Report (BTR1) of Bangladesh to the UN Framework Convention on Climate Change (UNFCCC) (Interim) Mujib Climate Prosperity Plan (MCPP) 2022–2041
Infrastructure Policy	Delta Plan 2100 (2018)
Energy Policy	Renewable Energy Policy (2008, updated 2025) Integrated Energy and Power Master Plan (IEPMP 2023, under revision)[5] SREDA Energy Efficiency and Conservation Master Plan up to 2030 (2015) Power System Master Plan (PSMP) 2010
Net-Zero Target	Bangladesh has not set the official net-zero target yet. However, a stakeholder workshop organized by MoEFCC and UNDP in October 2024 discussed an ambition to achieve net-zero emissions by 2060. The mitigation actions of key sectors include: ● **Energy**: (i) expand renewables—prioritizing solar (rooftop, parks, irrigation, floating, agrivoltaics) and supporting wind and biomass; (ii) reduce transmission and distribution losses; (iii) replace fuel-based peaking plants with battery energy storage (BESS); (iv) promote a

[1] UNFCCC (n.d.). First Biennial Transparency Report (BTR1) of Bangladesh to the UN Framework Convention on Climate Change (UNFCCC)
[2] World Population Review (2025). *Natural Disaster Risk by Country.* Available at: https://worldpopulationreview.com/country-rankings/natural-disaster-risk-by-country
[3] Government of Bangladesh (2021). *Updated Nationally Determined Contribution (NDC) – Bangladesh.* Available at https://unfccc.int/sites/default/files/NDC/2022-06/NDC_submission_20210826revised.pdf
[4] UNFCCC (2025). Bangladesh Third Nationally Determined Contribution (NDC 3.0). Available at: https://unfccc.int/sites/default/files/2025-09/Bangladesh%20Third%20Nationally%20Determined%20Contribution%20%28NDC%203.0%29.pd
[5] Power Division, Government of Bangladesh (2023). *Integrated Energy and Power Master Plan (IEPMP) 2023.* Available at: https://powerdivision.portal.gov.bd/sites/default/files/files/powerdivision.portal.gov.bd/page/4f81bf4d_1180_4c53_b27c_8fa0eb11e2c1/IEPMP%202023.pdf

	modal shift to MRT/BRT; (v) deploy EVs in public fleets; (vi) improve fuel efficiency and electrify transport and industry; (vii) decarbonize brick production; (viii) enhance energy efficiency in industry and buildings. ● **IPPU**: (i) implement CCUS; (ii) reduce HFC consumption. ● **AFOLU**: (i) scale up AWD in rice cultivation and short-duration rice varieties; (ii) adopt precision fertilizer application; (iii) improve feed and manure management; (iv) expand reforestation and coastal afforestation while preserving existing forests. ● **Waste**: (i) establish waste-to-energy and material recovery facilities; (ii) develop sewage treatment plants; (iii) develop sludge treatment plants.	
Energy Status	**Coal phaseout**	Coal phase-down in Bangladesh is conditional on international support.
	Renewable	By 2030, Bangladesh targets 912 MW RE (uncond.) and 4,114 MW (cond.) according to NDC 2.0, solar (581 MW), wind (149 MW), hydro (100 MW), solar mini-grids (56.8 MW), biomass (20 MW), biogas (5 MW). Yet in 2024, RE supplied only 2% of power (2.31 TWh of 113.9 TWh). Solar rose to 846 MW (from 496 MW), wind to 63 MW (from 3 MW), while hydro has stagnated at 230 MW since 2015. In the NDC 3.0, Bangladesh committed to increase renewable energy will share 25% of the total electricity demand by 2035 of which 40% of this target will be unconditional and 60% kept as conditional target.
	Green hydrogen	Bangladesh's IEPMP 2023 includes green H_2 from surplus RE, but the only pilot (BCSIR, Chittagong) uses biomass/biowaste for electrolysis. Surplus RE-based H_2 is not yet feasible due to the country's low RE share.
	Grid development	Bangladesh has allocated USD 0.87 billion for grid modernization to expand transmission capacity, support renewable energy integration, and reduce T&D losses, which remain around 10%, above the global average.
	Cross-border energy trade	Bangladesh imports 1,160 MW of mostly fossil fuel–based power from India, and will add 500 MW of hydropower from Nepal and imports from Bhutan by the early 2030s.
	Energy storage options	Bangladesh has not yet implemented pumped hydro storage (PHS) despite feasibility, due to land, cost, and site constraints. BESS is advancing, with pilot projects, government support, and growing private-sector interest. Bangladesh imports ≈1,160 MW from India via Bheramara–Baharampur (1,000 MW HVDC) and Tripura–Comilla (160 MW) and imports electricity from Nepal under the CBET agreement (Bangladesh, India, Nepal).
	Knowledge and peer learning platforms	SREDA[6]: platform promoting solar energy (PV), energy efficiency, and related capacity-building by SREDA. stakeholders emphasized the need to link any regional dashboard/MRV approach with Bangladesh's evolving national MRV architecture and reporting systems (e.g., BTR processes), to avoid parallel reporting burdens and strengthen credibility.
Industry	**Energy efficiency**	By 2030, Bangladesh wants to cut down its energy intensity in industrial production by 20%. Consultations identified high potential in the near-term in industrial energy audits, efficient cooling and passive buildings design, where such measures will reduce peak demand and enhance grid reliability and reduce investment pressure on supply-side expansion.
	Industrial decarbonization	Although no specific reduction target exists for the industrial sector, studies suggest an energy efficiency potential of 25–31%. Energy audits have been mandatory since 2018, but implementation remains limited and official progress reports are still lacking.

[6] Sustainable and Renewable Energy Development Authority (SREDA), Government of Bangladesh (n.d.). Official website. Available at: https://sreda.gov.bd/

Transport	**E-mobility**	Bangladesh aims for 30% EV penetration by 2030. Yet as of March 2025, only a few hundred EVs were registered, making up practically none of the total vehicle fleet. Adoption remains low due to a lack of incentives, high import duties, and limited grid capacity and charging infrastructure.
Potential Co-benefits	**Nature-based energy solutions**	Biogas (industrial use): Feasible through circular use of natural resources but constrained by limited incentives and weak policy support. Agri-PV: Has potential to optimize both energy and crop production, but is not included in official power development plans. Rooftop gardening: Can reduce the urban heat island effect, but adoption is low due to limited awareness, financial constraints, and lack of technical capacity.
	Disaster resilience	Expanding rooftop solar and solar mini-grid are keys to strengthening disaster resilience and reducing the risk of power shortages from infrastructure damage.
	Employment	In 2020, IRENA reported that most RE jobs in Bangladesh were in solar (~86%, mainly rooftop installation) and biogas (~9%). Between 2021–2035, the sector is expected to create 3.1 million new jobs, with solar providing over half.[7]
	Climate prosperity and climate justice	Expanding renewable energy and improving energy efficiency can cut fossil fuel imports and create new jobs. Self-sufficient RE solutions, such as rooftop solar and industrial biogas, also reduce dependence on the grid.
Finance Landscape & Gaps	**Immediate Scaling-up Requirement**: Bangladesh is experiencing a severe under-investment problem with its clean energy transition regarding its ambitious targets. The new Renewable Energy Policy (2025) aims for 20% of electricity from renewable sources by 2030, and 30% by 2040. An annual investment of $980 million is required until 2030, and $1.46 billion each year thereafter. However, the current yearly investments, which stand at approximately $238 million, fall significantly short, necessitating a four- to six-fold increase. **Public Funds:** State budget allocations and notable credits are growing, backed by World Bank instruments (e.g., $500 million IDA support, Clean Technology Fund grants). Donor flows (~$2.2 million from trust funds) supplement but inadequate to close the investment gap. **Domestic Financial Sector:** Structures such as Bangladesh Bank's green funds and IDCOL (for refinancing and credit guarantees) exist but remain bottlenecked by lengthy loan processes, collateral demands, and changing schemes. Access, particularly for rural and small-scale projects, is poor. **Private Sector:** The potential of the renewable energy sector in Bangladesh is high, although there are numerous challenges in the industry. It is possible to overcome the existing constraints, e.g., sudden policy changes (e.g., suspension of QEEESA-driven projects), currency volatility (Taki down 27% since 2022), and the withdrawal of sovereign guarantees. With the proper policy support and risk mitigation measures, domestic and foreign capital can be attracted to the sector, paving the way for a brighter future. **Innovations and Donor Support:** The key to overcoming the current challenges lies in expanding credit guarantees, pre-financing (not just refinancing) for green loans, PPPs for large sites, and donor-backed facilities for payment and currency risk. Such new financing tools and green bonds, global climate finance, and blended finance tools have the potential to significantly reduce the funding gap in Bangladesh and speed up the transition to clean energy. **Barriers:** Challenges include land acquisition (especially for utility-scale solar), currency devaluation, downgraded credit ratings, and lack of financial incentives (e.g., import duties still levied on key solar components). The National Budget FY25-26 omits dedicated renewable funding. **Financing Landscape & Gaps:** ● It is estimated that the annual climate/energy financing requirement is USD 12.5 billion (approximately 3% of GDP), but there is always a gap between requirements and flows (UNDP, 2025).	

[7] Sustainable and Renewable Energy Development Authority (SREDA), Government of Bangladesh (2023). Skill Gap in the Renewable Energy Sector in Bangladesh. Available at: https://seip-fd.gov.bd/wp-content/uploads/2023/03/Skill-Gap-in-the-Renewable-Energy-Sector-in-Bangladesh.pdf

	• Though the disbursement is slow, there is good access to concessional finance provided by ADB, World Bank, GCF, and bilateral donors. • Domestic banks are risk-averse; the primary method of rooftop and off-grid RE financing is through IDCOL. Stakeholders also pointed to the need for risk-mitigation instruments (e.g., credit enhancement, payment security, currency-risk solutions) to address high perceived risks and reduce financing costs for renewables, alongside stronger regional exchange on technical standards and bankability practices. • Green bonds and carbon markets are in the offing but not yet used effectively.
Institutional Readiness & Capacity	**Policy Framework:** SREDA is led under updated policies (Renewable Energy Policy 2025, Energy Conservation Act 2014, EE Master Plan 2015–2030). These policies strongly emphasize market reforms, cost-reflective tariffs, and improved governance, signalling the potential for positive change yet rapid, unpredictable changes that potentially undermine investor confidence. **Implementation Challenges:** Bangladesh's regulatory environment ranks among the weakest in South Asia (ADB/WEF index). Policy unpredictability, fragmented land administration, poor transmission/distribution infrastructure, low technical expertise, and bureaucratic inertia delay project development and deter local and foreign stakeholders, also leading to high investment risks. **Regulatory Strength:** Though an institutional reform roadmap exists, fragmented authorities (e.g., land admin, SREDA vs. BPDB, etc.), lack of digital records, high off taker risk, and the uncertain commitment to competitive procurement continue to impede progress. **Technical Capabilities & Coordination:** Some strengths exist (notably in GIS for system planning, capacity-building for BESS pilots, and technical studies), but overall technical capacity, especially for upscaling distributed renewables, is low. Project pipelines are weak, with limited inter-ministerial cooperation and underdeveloped digital records. **Risk Mitigation**: A payment security mechanism and currency risk mitigation facility are recommended but not institutionalized. Bankers, developers, and service providers require targeted capacity-building. To realize its Renewable Energy targets, Bangladesh urgently needs consistent policy signals, streamlined approvals, improved technical skills, and de-risking measures to foster private investment well beyond the patchwork of pilot initiatives. **Institutional Capacity:** • The Power Division and SREDA give policy guidance, yet ministries have limited coordination. • The regulatory authority (BERC) cannot implement tariff reforms and grid codes. • The implementation agencies (BPDB, REB) are limited regarding technical and financial resources. • Capacity-building initiatives are currently in place, yet the resilience of institutions is low.
Challenges	**Coal subsidies & lock-in**: Continued support for coal and LNG projects. **Delays & inconsistency:** Policy flip-flops, cancelled LOIs, and tender renegotiations. **Low incentives & bankability:** Weak incentives, unclear tariffs, and limited guarantees hinder financing. **Grid infrastructure:** Outdated, congested system with limited flexibility. **Regional trade infrastructure:** Limited financing for interconnections. **Renewable integration:** Poor intermittency management and lagging storage investment. **EV charging:** Slow rollout with weak standards, permitting, and incentives.
Country Priorities & Quick Wins	• Technical assistance and capacity building in biogas, rooftop solar, and industrial BESS can strengthen supportive policies and help crowd in private investment.

- Key opportunities include declining solar and storage costs, strong concessional finance pipelines, and growing potential in distributed renewables and industrial energy efficiency.
- Priority focus areas are to advance JETP, coal transition, and cross-border interconnections through policy advice, transaction support, and stakeholder engagement.
- Critical actions include strengthening regulatory frameworks and grid infrastructure, expanding de-risking instruments, and scaling technical assistance for rooftop solar, BESS, biogas, and industrial efficiency.

1.2 Bhutan

Table 2: Bhutan Country Diagnostic

Topic	Details
Demographic	Bhutan's population was 791,524 in 2023 and is projected to reach 825,471 by 2031 and 883,389 by 2051. The working-age group (15–64) makes up 73% of the total, pointing to a rising energy demand alongside economic growth. Electricity access is universal, while 45% of the population lives in urban areas—urbanization is expected to surpass half by 2031.
Socio-Economic	GDP reached USD 3 billion in 2023, with industry contributing USD 242 million (8%). While total GDP has grown steadily, the industry's share has shown fluctuations.
GHG Emission	In 2022, the total GHG emission was 1.74 $MtCO_{2e}$ and net GHG emission was negative due to carbon sink -11.36 $MtCO_{2e}$. The GHG emission by sector were: AFOLU 0.410 $MtCO_2e$ (23.54%), IPPU 0.67 $MtCO_2e$ (38.68%), energy 0.56 $MtCO_2e$ (32.10%), and waste 0.10 $MtCO_2e$ (5.68%).[8]
Climate Vulnerability	Bhutan ranks 173rd globally and 6th in the region for disaster risk. Earthquakes, landslides, and drought pose threats to energy infrastructure and hydro power generation capacity. By 2050, climate change in Bhutan could cut farm yields and hydropower, causing a 3% GDP loss. Adaptation will cost at least USD 3.2 billion to protect infrastructure, excluding hydropower.[9] The national roadmap now also requires new hydropower plants and dams to meet updated earthquake safety standards.[10]
Climate Policy	Bhutan's Nationally Determined Contributions 3.0[11] Climate Change Policy (2020) 13 FYP (2024 - 2029) 2nd NDC (2021) National Action Plan; NAP (2023) LTS (2023)
Infrastructure Policy	Bhutan National Plan for Infrastructure Resilience[12]
Energy Policy	National Energy Policy (2025)[13]

[8] Royal Government of Bhutan (2021). Bhutan's First Biennial Transparency Report to the United Nations Framework Convention on Climate Change (UNFCCC). Available at: https://unfccc.int/sites/default/files/resource/Bhutan%20BTR1.pdf

[9] World Bank (2025). Bhutan Country Climate and Development Report. Available at: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099062425142074685

[10] World Bank (2025). A Decade of Resilience: Bhutan and the World Bank Forge a Model Partnership on Climate and Disaster Risk Management. Available at: https://www.worldbank.org/en/news/feature/2025/09/10/a-decade-of-resilience-bhutan-and-the-world-bank-forge-a-model-partnership-on-climate-and-disaster-risk-management

[11] Royal Government of Bhutan (2020). Third National Communication of Bhutan to the United Nations Framework Convention on Climate Change (UNFCCC). Available at: https://unfccc.int/sites/default/files/resource/TNC%20of%20Bhutan%202020.pdf

[12] United Nations Office for Disaster Risk Reduction (UNDRR) & Centre for Disaster Preparedness and Response (CDRI) (2025). *Bhutan — Disaster Risk Reduction and Management Report.* Available at: https://dymez6ioe12by.cloudfront.net/media/wp-content/uploads/2025/05/26110312/1828472238678899_202504041143undrr_cdri_bhutan.pdf

[13] Ministry of Energy & Natural Resources, Royal Government of Bhutan (2025). National Energy Policy 2025: Empowering Energy Security & Sustainable Growth. Available at: https://www.moenr.gov.bt/wp-content/uploads/2017/07/National-Energy-Policy-2025.pdf

	National Hydrogen Roadmap (2024)[14] Energy Efficiency Roadmap (2019)[15] Low Emission Development Strategy for Industry 2021 (2021)[16] The National Energy Policy 2025 consolidates prior policies and sets a diversification pathway, including enabling conditions for private participation, alongside stronger demand-side efficiency measures.	
Environment Policy	National Environment Strategy; NES (2020) Third National Communication ; TNC (2020) Biennial Update Report (BUR) to UNFCC: (2022) Biennial Transparency Report (BTR) to UNFCCC: (2024)	
Net-zero Target	Bhutan has set the net-zero target by 2050.	
Energy Status	**Coal phaseout**	Bhutan has no coal-fired power plants; coal is used mainly in industry (cement kilns) targeted to fuel-switching (e.g., refuse-derived fuels).
	Renewable	The National Energy Policy 2025 targets 25 GW by 2040 (15 GW hydro, 5 GW solar), signaling rapid near-term scale-up. Progress requires fast-tracking solar and wind, diversifying with reservoir hydro, expanding transmission, and deploying storage (BESS/PSH). During 2015 to 2023, Bhutan only installed additional capacity from hydropower, 0.72 GW.[17] The National Energy Policy 2025 targets 25,000 MW RE installed capacity by 2040 (including 20,000 MW hydropower and 5,000 MW solar), reflecting a diversification agenda alongside energy security concerns.
	Green hydrogen	Bhutan's Hydrogen Roadmap (2024) sets a goal of 70,000 tons of green hydrogen production per year by 2050[18], mainly for transport and industry. The strategy emphasizes pilot electrolyzers powered by wet-season hydropower, supported by BESS/PSH to manage variability and cross-border trade to maximize utilization.
	Grid development	In 2024, Bhutan's peak demand exceeded firm supply by 125%, creating a winter power deficit. Policy priorities include grid automation, ancillary services, and modern infrastructure to integrate renewables. With T&D losses already low (5.54% in 2022), the focus shifts to digitalization and network reinforcement.
	Cross-border energy trade	Bhutan exports hydropower to India in the wet season and imports in winter season, leveraging complementary regional patterns. It is pursuing Indian investments and MoUs to expand exportable clean power, helping balance seasonal deficits, monetize generation, and boost domestic renewable integration.
	Energy storage options	The Power System Master Plan 2040 highlights pumped-storage potential, with Bhutan's first ESIA for the Gongri–Jeri project launched in 2024, offering firming and balancing benefits but facing cost and safeguard challenges. The 2025 Energy Policy promotes BESS as a faster grid solution despite lifecycle costs, while enhanced Bhutan–India interconnections provide near-term "virtual storage" through power banking and swaps.

[14] Department of Energy, Ministry of Energy and Natural Resources, Royal Government of Bhutan (2024). Hydrogen Roadmap of Bhutan (National Hydrogen Roadmap). Available at: https://www.moenr.gov.bt/wp-content/uploads/2017/07/National-Hydrogen-Roadmap.pdf
[15] Department of Renewable Energy, Ministry of Economic Affairs, Royal Government of Bhutan (2019). Energy Efficiency Roadmap. Available at: https://policy.asiapacificenergy.org/sites/default/files/Energy%20Efficiency%20Roadmap%202019.pdf
[16] Ministry of Economic Affairs, Royal Government of Bhutan (2021). Low Emission Development Strategy for Industries. Available at: https://www.undp.org/sites/g/files/zskgke326/files/2023-01/LEDS_Industries.pdf
[17] Ember (n.d.). Electricity Data Explorer: Bhutan (capacity data). Available at: https://ember-energy.org/data/electricity-data-explorer/?data=capacity&entity=Bhutan
[18] Ministry of Energy and Natural Resources, Royal Government of Bhutan (2024). Launch of National Hydrogen Roadmap. Available at: https://www.moenr.gov.bt/?p=14115

	Knowledge and peer learning platforms	Bhutan does not have a dedicated government-led online platform for energy transition, but relevant guidelines are available on ministry websites—such as MOENR for energy efficiency and MOIT for green building.
Industry	**Energy efficiency**	Bhutan's EE Roadmap targets savings of 17 kTOE (buildings), 148 kTOE (appliances), and 35 kTOE (industry). Measures like labeling, efficient lighting, cookstoves, codes, and audits remain pilot-scale with limited finance and oversight. The World Bank (2024) highlights untapped potential, urging stronger enforcement and private-sector involvement. Consultation feedback noted a practical delivery gap: Bhutan currently lacks sufficient domestic energy auditing capacity, suggesting strong potential for regional auditor training and certification programs.
	Industrial decarbonization	Bhutan's Energy Efficiency Roadmap (2019) focuses on energy management, auditing, and implementing the EE such as VSD, VFD, upgraded combustion systems, efficient motors.etc.
Transport	**E-mobility**	Bhutan's EV Roadmap (2019) targets 70% of passenger vehicle sales by 2035 and nearly 100% by 2050, but adoption remains very low, with fewer than 1,000 EVs by 2024 due to high costs, limited charging infrastructure, and weak incentives.
Potential Co-benefits	**Nature-based energy solutions**	Biogas: a utility-scale pilot under the National Fertilizer Strategy (2023–2030)[19]
	Disaster resilience	Energy diversification such as expanding biogas, rooftop solar, wind, and regional power trade reduces reliance on hydropower.
	Employment	Hydropower accounts for less than 1% of total employment in Bhutan[20]. However, this share may rise as the country plans to expand generation, currently utilizing only 9% of its hydropower potential.
	Climate prosperity and climate justice	Leveraging surplus wet-season hydropower for regional trade can boost GDP. Additionally, biogas subsidies and rooftop solar can improve energy access and affordability in rural areas.
Finance Landscape & Availability	**Domestic Public Finance**: The Royal Government of Bhutan strategically reinvests hydropower export revenues, supports capacity building, and underpins renewable energy project development through ministries and state-owned enterprises (DGPC, BPC). Strong focus is placed on aligning financing with the 25,000 MW target by 2040 (15,000 MW hydro, 5,000 MW solar). **Multilateral, Donor, and Bilateral Finance**: Bhutan has established active partnerships with MDBs (e.g., World Bank, ADB), European Investment Bank (EIB), the International Solar Alliance (ISA), and bilateral donors (EU, India). These partnerships, foundational to some of their initiatives, provide reassurance about Bhutan's international support. Recent commitments include a €150 million EIB loan (hydro/solar), a Green Partnership with ISA, and ongoing UNDP technical assistance. **Private and Blended Finance**: The 2025 National Energy Policy (NEP) is a significant step in Bhutan's energy financing strategy. It liberalizes the sector to private and strategic FDI, and caps (49% foreign ownership in PPPs, 100% of repatriation of profits per FDI regulation). The policy entails that commercial banks set aside some of their lending books to renewables/EE, encourage green bonds and IPOs, and focus on blended finance (e.g., green investments through the Green Financing Guidelines of RMA). **Innovation**: New initiatives include mechanisms for household-level solar PV (net-metering, dedicated subsidies), market access for carbon credits (proceeds retained by project developers), and active exploration of green hydrogen, battery storage, and emerging technologies. **Challenges**: Macroeconomic resource constraints persist, yet the finance architecture is increasingly robust and diversified.	

[19] BioEnergy Times (2025). Bhutan launches first utility-scale biogas project in Thimphu on World Environment Day. Available at: https://bioenergytimes.com/bhutan-launches-first-utility-scale-biogas-project-in-thimphu-on-world-environment-day/

[20] World Bank (2025). Bhutan Country Climate and Development Report. Available at: https://openknowledge.worldbank.org/entities/publication/c3988d59-a6e8-4ea5-8297-d4deace008c1

	Finance Landscape & Gaps: ● The hydro and solar expansion up to 2040 will cost USD 26 billion to finance (ADB, 2025). ● Traditionally dependent on Indian domestic and bilateral financing, it has restricted access to commercial finance. ● The 2025 BTN-linked loan of IFC to Bhutan Power Corporation is the first global commercial investment in the industry. ● PPP structures are in place but still immature; support from concessional finance remains imperative.
Institutional Readiness & Capacity	**Policy Framework:** NEP 2025 presents as a comprehensive national framework, which incorporates older policies (hydro, EE, tariff, alternative RE) and creates a single vision in relation to Gross National Happiness (GNH) and carbon neutrality. **Institutional Architecture**: The Ministry of Energy and Natural Resources (MoENR) takes the lead, supported by the Department of Energy (DoE), which is responsible for the project pipeline, norms, pilot projects, and technical oversight. The Electricity Regulatory Authority (ERA) sets tariffs, codes, and technical standards. Bhutan Power System Operator (BPSO), Druk Green Power Corporation (DGPC), and Bhutan Power Corporation (BPC) provide operations, trade, and distribution. **Regulatory Strength**: ERA provides robust licensing and sector oversight, ensuring the security and stability of the energy sector. This is supported by regular reviews, transparent concession processes (e.g., 30-year for hydro, 25-year for solar), transparent land and environmental management criteria, and dynamic tariff setting (including ToU pricing, multi-year review). **Technical Capability**: Bhutan's focus on large-scale upscaling capacity, a 10-fold increase by 2040, including solar, wind, and bioenergy is underpinned by the increasing technical sophistication of DGPC and BPC, modernizing infrastructure (AI, smart grids, BESS), and emphasizing local workforce development and knowledge transfer. The policy's emphasis on multiple technical R&D partnerships with universities (e.g., STAR-C) is a testament to its commitment to innovation. **Capacity Building**: Institutional reforms, workforce training, and mandatory localization strategies are integrated, with specialized curricula and targeted efforts to address knowledge loss from civil service reforms and emigration. **Inclusiveness**: The policy encourages extensive stakeholder engagement, including local governments, women and youth, and civil society. **Risks**: Implementation at scale can strain institutional resources, but the system overall is exemplary for the region. **Institutional Capacity:** ● Powerful central institutions (MoENR, DGPC, BPC) have clear mandates. ● ERA is operational but ill-equipped for emerging RE technologies. ● Technical skills were focused on hydropower, low solar, wind, and storage capacity. ● Long-term direction is given by planning frameworks (Power System Master Plan 2040, RE Master Plan 2032).
Challenges	**Unreliable RE generation:** Low hydropower in the dry season causing generation deficits especially when electricity demand also peaks. **Regional trade infrastructure:** Limited financing for interconnections. **Limited capacity to scale RE technologies:** Few local firms can design/install systems; regulatory processes are not fully streamlined, and no central knowledge hub exists.
Country Priorities & Quick wins	**Provide technical assistance, capacity building, policy advocacy to diversify generation** from scaling-up biogas and solar rooftop and **energy transition (RE & EE & electrification) for private sectors**. **Support regional interconnections for seasonal balancing** through policy advice, transaction facilitation, and stakeholder engagement.

1.3 India

Table 3: India Country Diagnostic

Topic	Details
Demographic	India's population is 1.45 billion in 2024, projected to reach 1.54 billion by 2031 and 1.68 billion by 2051. By 2023, electricity access covered 99.5% of the population, with 36% living in urban areas.
Socio-economic	In 2024, GDP reached USD 3.9 trillion, with industry contributing USD 490 billion (12%). While both total GDP and industrial output increased, industry's share of GDP declined.
GHG emission	In 2020, India emitted total GHG emission at 2,959 $MtCO_{2e}$ and net GHG emission at 2,437 $MtCO_{2e}$ (2020).[21] In the base year, GHG emissions were: energy 2,238.00 $MtCO_2e$ (75.68%), IPPU 238.56 $MtCO_2e$ (8.06%), agriculture 405.98 $MtCO_2e$ (13.72%), and waste 75.64 $MtCO_2e$(2.56%). The LULUCF sector was a net carbon sink at –521.93 $MtCO_2e$.
Climate vulnerability	India ranks 3rd globally and 1st in the region for disaster risk[22], with high exposure to hydro-meteorological hazards. Assam, Andhra Pradesh, and Maharashtra States are the most vulnerable. Adaptation costs are estimated at USD 1–1.5 trillion by 2030.[23]
Climate policy	National Action Plan on Climate Change (2008) India's Updated First NDCs (2022)[24] India's Long-Term Low-Carbon Development Strategy (2025)[25]
Infrastructure policy	National Infrastructure Pipeline 2019 – 2025 (2020)[26]
Energy policy	National Energy Efficiency Mission (2010) National Cooling Action Plan (2019)[27] National Electricity Plan (2023)[28] State Energy Efficiency Action Plan (example: Delhi 2024)[29]

[21] Government of India (2024). Biennial Update Report (BUR) 4. Available at: https://unfccc.int/documents/645149
[22] World Population Review (2025). Natural Disaster Risk by Country. Available at: https://worldpopulationreview.com/country-rankings/natural-disaster-risk-by-country
[23] Deloitte India (2025). India needs to invest US$1.5 trillion by 2030 for climate action at scale: Deloitte report (press release, 17 July 2025). Available at: https://www.deloitte.com/in/en/about/press-room/india-needs-to-invest-usd-1-5-trillion-by-2030.html
[24] UNFCCC (2022). India: Updated First Nationally Determined Contribution. Available at: https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf
[25] UNFCCC (2022). India's Long-Term Low-Emissions Development Strategy (LT-LEDS). Available at: https://unfccc.int/sites/default/files/resource/India_LTLEDS.pd
[26] India Investment Grid (n.d.). National Infrastructure Pipeline. Available at: https://indiainvestmentgrid.gov.in/national-infrastructure-pipeline
[27] Ministry of Environment, Forest and Climate Change, Government of India (2019). India Cooling Action Plan. Available at: https://ozonecell.nic.in/wp-content/uploads/2019/03/INDIA-COOLING-ACTION-PLAN-e-circulation-version080319.pdf
[28] Central Electricity Authority (CEA), Ministry of Power, Government of India (2023). National Electricity Plan (Volume I: Generation). March 2023 (notified 31 May 2023). Available at: https://cdnbbsr.s3waas.gov.in/s3716e1b8c6cd17b771da77391355749f3/uploads/2023/09/202309011256071349.pdf
[29] Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India (2024). State Energy Efficiency Action Plan, Delhi (white paper). Available at: https://beeindia.gov.in/sites/default/files/06.%20SEEAP%20Whitepaper_NCT_Delhi.pdf

	National Green Hydrogen Mission (n.d.)[30]	
Net-zero target	India has set a net-zero target by 2070.[31] Mitigation strategies stated in their LT-LEDS are provided as themes below: ● **Electricity systems:** (i) develop a low-carbon power system by expanding renewables through centralized options (e.g., offshore wind, utility-scale solar, onshore wind parks, floating PV) and decentralized solutions (e.g., rooftop solar, agri-PV, mini- and microgrids); (ii) strengthen grid flexibility; (iii) explore low-carbon technologies such as nuclear and green hydrogen; (iv) implement demand-side management; (v) rationalize fossil-fuel use (e.g., shutting down inefficient thermal plants). ● **Transport system:** (i) decarbonize transport by improving vehicle efficiency; (ii) shift to public and lower-emission mobility modes. ● **Industrial system:** (i) accelerate electrification; (ii) improve energy and material efficiency in industry and buildings.	
Energy status	**Coal phaseout**	As of September 2025, India has not signed a JETP, as it rejects binding coal phase-out commitments.[32] Instead, the country conditions any coal phase-down on domestic capacity, grid reliability, economic viability, and technology readiness.
	Renewable	India has already reached ~50% non-fossil installed capacity (solar 123.130 GW, wind 52.681 GW, biomass cogeneration 10.743 GW, other biomass 922 MW, waste-to-energy 309 MW, small hydro 5,109 MW) ahead of 2030[33]; it targets 500 GW non-fossil by 2030. Scaling requires continued annual additions of solar/wind, transmission expansion, and system flexibility.
	Green hydrogen	India's Green Hydrogen Mission targets at least 5 MMT annually by 2030, requiring ~125 GW of new renewables, coastal hubs (Mundra, Kandla, etc.), and storage rules for variable RE. Early progress includes Adani's 5 MW pilot, L&T's 800 kW plant, BPCL's planned 20 MW project, GAIL's 10 MW project, and 862,000 t/yr of awarded capacity.
	Grid development	India is investing ~US$108 billion in transmission and US$36–40 billion in distribution under the five-year RDSS, which aims to cut AT&C losses to 12–15% by 2024–25. Losses remain near 15% with wide state variation, underscoring the need for digitalization and T&D expansion to integrate more renewables.
	Cross-border energy trade	India serves as the main electricity exporter in the region, but also imports low-carbon hydropower from Nepal and Bhutan to cover seasonal deficits, manage variability, and support the integration of solar and wind.
	Energy storage options	India plans to develop 47 GW of BESS and 31 GW of pumped hydro storage with renewables.[34] It trades regionally by importing surplus hydro from Bhutan and 10 GW under a 10-year deal with Nepal, while exporting to Bangladesh.
	Knowledge and peer learning platforms	BEE: Bureau of Energy Efficiency; government setup entity focusing on energy efficiency TERI: non-profit research organization focused on energy, environment, climate change, and sustainable development.

[30] Haryana Renewable Energy Development Agency (HAREDA) (2024). National Green Hydrogen Mission. Available at: https://hareda.gov.in/about-department/national-green-hydrogen-mission/
[31] UNFCCC (2022). India's Long-Term Low-Emissions Development Strategy (LT-LEDS). Available at: https://unfccc.int/sites/default/files/resource/India_LTLEDS.pdf
[32] Clean Energy Wire (2024). India, donor countries give up on Just Energy Transition Partnership – German official (20 Nov 2024). Available at: https://www.cleanenergywire.org/news/india-donor-countries-give-just-energy-transition-partnership-german-official
[33] NITI Aayog (2025). India Climate & Energy Dashboard (ICED): Electricity generation. Available at: https://iced.niti.gov.in/energy/electricity/generation
[34] Press Information Bureau, Government of India (2024). National Electricity Plan (Transmission) launched by Cabinet Minister for Power and Housing & Urban Affairs (press release, 14 Oct 2024). Available at: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2064751&reg=3&lang=2i

Industry	Energy efficiency	India's NDC targets a 45% reduction in emissions intensity of GDP by 2030, alongside its goal of doubling energy efficiency with 89.1 MTOE savings by 2030. Its cooling efficiency plan aims to cut primary cooling energy use by 30% by 2037–38. India is also advancing demand flexibility reforms and operationalizing a national carbon market to accelerate decarbonization.
	Industrial decarbonization	The LTD targets industrial decarbonization by 2050[35] through 50% fossil fuel substitution via electrification and hydrogen, 1.3% annual energy efficiency gains, 15–20% demand reduction in cement and steel, and a USD 50 carbon price.
Transport	**E-mobility**	India targets to have 30% of EVs penetration by 2030. The current policy PM-EDRIVE 2025 focuses on EVs buyer incentives of the targeted vehicles such as 2 wheelers, buses, and trucks. The number of EVs sold in 2025 was 2 million, mainly contributed from 2 wheelers.[36]
Potential co-benefits	**Nature-based energy solutions**	Passive cooling: Included in India's ICAP and piloted in affordable housing with UNEP support. Agri-PV: Feasible with crop benefits, but hindered by regulatory gaps despite grid and tech readiness.
	Disaster resilience	Decentralized RE and demand reduction enhance self-sufficiency, reduce grid dependence, and diversify renewable sources beyond weather-dependent hydropower.
	Employment	In 2023, India's RE sector employed about 1 million people, including 453,000 in hydro, 319,000 in solar, and 52,000 in wind.[37] Power sector jobs are projected to reach 1.7–2.2 million by 2030, with battery storage and efficiency adding 1.7 million and 1 million jobs, respectively.[38]
	Climate prosperity and climate justice	Matching renewable energy demand with domestic PV and BESS production can boost the economy, create millions of jobs, reduce fossil fuel imports, and lower energy costs, making electricity more accessible and affordable.
Finance Landscape & availability	**Finance Scale and Diversification**: India, uniquely among regional countries, is mobilizing investment at a global transition scale over $62 billion (2017–2025), mainly in renewables. However, the energy transition needs remain vast ($170 billion/yr to meet national goals). It is worth noting that local banks and other financial institutions are the main contributors to this green investment, which indicates that they are essential in ensuring the sector's stability. The emergence of green bonds, sustainability-linked loans, and PLI (Production Linked Incentive) plans further diversifies the investment environment. **Budgetary Measures**: The FY25-26 Union Budget allocates ₹21,847 crore to power, ₹26,549 crore to renewables, and significantly expands support for emergent clean tech. This includes rooftop solar, battery manufacturing, and emerging clean tech such as green hydrogen, critical minerals, and nuclear SMRs. The exemptions on key imports, expanded credit lines, and viability gap funding for BESS and offshore wind further underpin the sector, making the future outlook optimistic. **Donor and Multilateral**: The World Bank, ADB, and GCF provide substantial lines of credit (e.g., ADB/GCF $200 million for India Green Finance Facility), typically as blended finance to 'crowd in' private capital for new technologies (green hydrogen, electric vehicles, advanced storage).	

[35] WRI India (2025). Pathways to Net Zero: Policies and Measures for Industrial Decarbonization in India (Expert Note). Available at: https://wri-india.org/sites/default/files/Pathways-to-net-zero-Expert-Note.pdf
[36] DIYguru | eMobility Academy (n.d.). India's EV Policy 2025 Explained. Available at: https://diyguru.org/guide/indias-ev-policy-2025-explained/
[37] IRENA (2024). Renewable energy and jobs: Annual review 2024. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Oct/IRENA_Renewable_energy_and_jobs_2024.pdf
[38] International Energy Agency (IEA) (2024). World Energy Employment 2024. Available at: https://iea.blob.core.windows.net/assets/d2b4b054-4a55-4c6f-893f-fc2c2b77e9a1/WorldEnergyEmployment2024.pdf

	Private Sector and Innovations: It is worth noting that private equity, venture capital, and specialized infrastructure NBFCs (IREDA, PFC, REC, etc.) are the driving force behind most green infrastructure funding. Their significant role in funding and their commitment to the sector are central to the rapid growth of new solar/wind capacity, e-mobility, and battery storage ventures. Market mechanisms (e.g., green bonds, urban sustainability projects) are scaling, further boosting our confidence in the sector's growth. **Challenges:** Despite the significant scale of investment, the pace of deployment still lags requirements, particularly in the areas of transmission, offshore wind, and energy storage. Addressing these deployment challenges presents significant opportunities for growth and innovation in the renewable energy sector. **Finance Availability & Gaps:** ● In 2024, USD 2.4 billion in DFI clean energy finance was attracted to India; 83% of investment in the power sector was invested in clean energy (IEA, 2025). ● The capital markets are deep within the country; in 2023, FDI in power amounted to USD 5 billion. ● The RE cost of capital is the lowest among the emerging markets, at 80 percent greater than that of advanced economies. ● India Green Finance Facility (2025) of ADB/GCF includes hydrogen, storage, and biogas concessions.
Institutional readiness & capacity	**Policy Framework**: The policy environment in India is well-articulated, which can be attributed to the country's commitment to renewable energy. The aims of 500 GW non-fossil capacity by 2030 and net-zero by 2070, which are enshrined in law and practice, show the country's commitment (e.g., National Electricity Policy, Green Hydrogen Mission, National Critical Minerals Mission).The regulatory environment, ranking second in South Asia (WEF/ADB index), further solidifies India's success. **Governance and Regulation**: Strong central ministry (MNRE), empowered independent regulators (CEA, CERC), and state-level nodal agencies enable broad and consistent implementation. **Technical Capability**: Significant technical capacity has been developed, particularly in grid integration, renewable project management, BESS, and green hydrogen demonstration. The government leads digitalization, benchmarking (both at the central and state levels), and policy experimentation (open access, offtake contracts, etc.). **Private Sector Engagement:** The state and the private banks, NBFCs, and SECI in India have been central to the creation of credible institutions that can conduct investment in the renewable sector, at scale, competitively. Their presence has greatly de-risked the industry with intermediate market infrastructure, which has heralded a bright future in renewable energy. **Innovation and Integration**: Cross-sectoral coordination supports energy transition in mobility, industry, and urban sectors. Policies exist for distributed energy, rooftop solar, off-grid solutions, and cross-border trade. **Gaps and Risks**: Transmission upgrades, distribution company (DISCOM) health, complex federal-state coordination, and grid modernization remain challenges. Ambition is high, but bureaucratic delays and legacy issues in legacy sectors, such as the slow adoption of renewable energy technologies and the reliance on traditional fossil fuels, persist and hinder the pace of the energy transition. **Institutional Capacity:** ● Well-established policy institutions (MNRE, MoP/CEA, SECI, BEE) in scaling RE. ● DISCOMs at the state level are weak financially, and USD 75 billion in losses were accrued in 2023. ● There are developed regulatory frameworks that are disproportionate. ● The procurement and auction institutional capacity is known worldwide, whereas grid integration and DISCOM reform are bottlenecks.
Challenges	**Regional trade infrastructure:** Limited by unclear policies and lack of coordinated investment frameworks for cross-border electricity trade. **Coal dependency:** Continued government support for coal reflects energy security concerns, slowing the shift to cleaner RE based energy.

Opportunities	**Builds capacity for BESS deployment and grid modernization to enable high RE integration.** **Provides technical assistance or capacity buildings for scaling up hydrogen pilot projects to commercialized scale.** **Facilitates cross-border interconnections, regional clean tech supply chains, carbon trading** through policy, transactions, and stakeholder engagement.

1.4 The Maldives

Table 4: Maldives Country Diagnostic

Topic	Details	
Demographic	The Maldives had a population of 527,799 in 2024, projected to reach 541,921 by 2031 and 591,628 by 2051. Electricity access covers 94% of the population, with 42% living in urban areas.	
Socio-economic	In 2024, GDP reached USD 6.9 billion, with industry contributing just 2%. While overall GDP has grown, the industrial sector's output has fluctuated and its share has declined.	
GHG emission	In 2022, Maldives emitted total GHG emission of 2,960 $ktCO_{2e,}$ where emission from energy sector was 2,273.07 $ktCO_{2e}$ (96.33%) and waste sector contributed 86.64 $ktCO_{2e}$ (3.67%)[39]	
Climate vulnerability	The Maldives ranks 176th globally and 7th in the region for disaster risk. Sea level rise and flooding are the primary threats, with adaptation costs estimated between USD 2 and 4 billion.[40]	
Climate policy	Maldives' Third Nationally Determined Contribution (NDC 3.0) 2025[41] Maldives Climate Change Policy Framework (MCCPF) 2015-2025	
Energy policy	Maldives Energy Acts 2021 Energy Policy and Strategy 2024-2029[42]	
Net-zero target	The Maldives aims for a net-zero target by 2030 with international supports[43]. The strategies for decarbonizing GHG emission include: ● Scale up renewables to meet 33% of electricity demand. ● Enhance energy efficiency (expand energy labeling, upgrade the grid to cut losses). ● Improve waste management (expand waste-to-resource recovery). ● Shift to cleaner transport (introduce national vehicle emission standards, expand public transit networks, and provide incentives for EVs and HEVs).	
Energy status	**Coal phaseout**	The Maldives has no coal-fired power plants. Diesel is the main fossil fuel for electricity generation.
	Renewable	At COP28, President Dr. Mohamed Muizzu pledged to achieve 33% renewable electricity by 2028. International and private sector support plays a central role. By 2028, Maldives plans 93 MW of RE from solar PV, hybrid

[39] UNFCCC Maldives (2024). Maldives' First Biennial Transparency Report (BTR1) to the United Nations Framework Convention on Climate Change (UNFCCC). Available at: https://unfccc.int/documents/643923
[40] World Bank (2024). Country Climate and Development Report: The Maldives. Available at: https://openknowledge.worldbank.org/server/api/core/bitstreams/ff0d23ef-4786-4c3d-9a47-520e13e677ce/content
[41] Ministry of Tourism and Environment, Republic of Maldives (2025). Maldives' Third Nationally Determined Contribution (NDC 3.0): National Climate Action Plan Towards Resilience and Low-Carbon Development. Available at: https://unfccc.int/sites/default/files/2025-02/Maldives%E2%80%99%20Third%20Nationally%20Determined%20Contribution.pdf
[42] Ministry of Climate Change, Environment and Energy, Republic of Maldives (2024). Energy Policy and Strategy 2024–2029. Available at: https://www.environment.gov.mv/v2/wp-content/files/publications/20250312-pub-energy-policy-and-strategy.pdf
[43] Ministry of Environment, Republic of Maldives (2020). Update of Nationally Determined Contribution of Maldives. Available at: https://unfccc.int/sites/default/files/NDC/2022-06/Maldives%20Nationally%20Determined%20Contribution%202020.pdf

		systems with BESS, and WTE. An additional 331 MW of potential includes large-scale PV and floating solar with storage.[44] In 2024, the solar installed capacity in Maldives was 50 MW.[45] The Energy Roadmap 2024–2033 frames the transition through flagship interventions including rooftop solar acceleration, grid flexibility, tariff reform, regulatory strengthening, and improved energy data systems to monitor results.
	Green hydrogen	The Maldives is studying green hydrogen and drafting a national roadmap, but no official capacity targets or implementation plans have not been released yet.
	Grid development	The country has modernized the grid for supporting VRE integration, however the technical standards or detailed grid codes have not been published yet.
	Cross-border energy trade	The Maldives has not planned or implemented cross-border electricity trade due to its isolated geography. Developing undersea interconnections would require substantial investment, making such trade currently unfeasible.
	Energy storage options	Storage is integrated with solar through international support. For example, the ASSURE program supports 20 MW of planned hybrid plants with BESS, while ARISE supports 26 MW.
	Knowledge and peer learning platforms	Maldives does not have a dedicated government knowledge-sharing platform. However, the Ministry of Tourism and Environment has hosted training for several topics such as climate finance frameworks, GHG emission reduction in sectors.
Industry	**Energy efficiency**	No specific energy savings target has been set, but the government promotes efficiency through appliance labeling, standards, and building codes under the 2024–2029 Energy Policy.
	Industrial decarbonization	There is no dedicated policy yet, though general mitigation strategies in energy, transport, and waste indirectly support emissions reduction in industry.
Transport	**E-mobility**	No formal EV target is set, but the Maldives promotes adoption by lowering import duties on EVs and banning fossil fuel vehicle imports older than five years.
Potential co-benefits	**Nature-based energy solutions**	Due to limited land availability, the Maldives has limited direct opportunities for large-scale nature-based energy solutions, unless the oceanscape is used for RE development.
	Disaster resilience	Solar + BESS systems reduce dependence on vulnerable grid infrastructure (e.g. subsea cables), improve disaster resilience, and produce less air and noise pollution than diesel generators—crucial for island environments like in the Maldives.
	Employment	The Maldives' energy roadmap anticipates job creation from expanding renewable energy, but it does not provide specific employment projections.

[44] Ministry of Climate Change, Environment and Energy, Republic of Maldives (2024). Paving the Way for a Just Energy Transition in Maldives: Road Map for the Energy Sector 2024–2033. Available at: https://www.environment.gov.mv/v2/wp-content/files/publications/20241107-pub-energy-roadmap-maldives-2024-2033-.pdf

[45] Ember (n.d.). Electricity Data Explorer: Maldives (capacity). Available at: https://ember-energy.org/data/electricity-data-explorer/?data=capacity&entity=Maldives

	Climate prosperity and climate justice	Shifting from diesel to solar and BESS can reduce Maldives' fuel import costs (~10 of GDP), [46] create local green jobs in installation and maintenance, and enhance tourism resilience by powering resorts with renewables that strengthen sustainability branding and energy independence.
Finance Landscape & availability	**Public Finance**: Despite the limited fiscal space, the success of our climate spending initiatives is evident. 2021 the PSIP allocated over $300 million, with at least $40 million dedicated to climate/energy. Furthermore, state-led climate trust funds like the Green Fund collect over $38 million annually. There are even proposals for upgrading to a Green National Development Bank, showcasing the potential for further growth. **Donor/Multilateral**: The government aggressively leverages MDBs (ADB, EIB, WB), GCF, UNDP, and various bilateral funds for both physical infrastructure (POISED, greater Male waste-to-energy, Addu City RE, etc.) and technical assistance (INFF, governance, and financial structuring). GCF supports integrated coastal protection, water security, and energy infrastructure. **Private Sector:** The participation of the private sector, especially PPP models such as ASPIRE/ARISE, has demonstrated promising outcomes. These models have resulted in private investment in distributed solar, especially in Male-Hulhumale, and new innovative green fund products that have helped create sustainable banking and credit guarantee schemes. With open FDI regimes for climate investment, the potential for further growth is significant. **Blended and Innovative Finance**: Use of concessional debt, grants, credit guarantees, and blended public–private arrangements for solar, waste-to-energy, and adaptation. International climate finance accreditation and a sustainable finance taxonomy are underway to guide further scale. **Barriers**: Despite the progress in climate finance, significant challenges need to be addressed. These include severe vulnerability to the cost of capital, operational risks, and high dependency on imports, especially diesel fuel and equipment. Donor dependence and foreign exchange constraints also limit the scale of climate finance initiatives. **Finance Availability & Gaps:** • The country is highly dependent on imported diesel (10% of GDP in 2021); fiscal space is small. • The POISED program of ADB and UNDP/UNCDF blended finance pilots are significant sources of RE investment. • The recent risk participation scheme raised USD 3.1 million in rooftop solar clean energy loans (UNDP, 2025). • Private sector participation is low; concessional financing and guarantees are necessary.
Institutional readiness & capacity	**Policy Framework**: Maldives boasts an advanced, climate-integrated legal/institutional framework, with strong cross-sectoral strategies (Strategic Action Plan, Climate Emergency Act, Energy Policy and Strategy 2024–2029, National Resilience/Recovery Plan). The INFF provides a model for gender-responsive, climate-focused finance. **Regulatory Institutions:** The Energy Act (2021) has brought a new dawn in the energy sector in the Maldives, where a strong licensing system is in place concerning renewables, grid feed-in, and energy efficiency norms. The consolidated technical oversight of the Utility Regulatory Authority gives it a solid base on which compliance and best practice can be guaranteed. **Technical Capacity:** POISED/ASPIRE programs have been a massive success as they provide technical skills transfer, sector-wide standards, and curriculum changes to local capacity. These successes are supported by international collaboration (ISA, IRENA, ITA, etc.), which opens the way to the bright future of the energy industry in the Maldives.

[46] Waheed, A. (2018). Maldives: Storage for a renewable future (presentation). Climate Investment Funds. Available at: https://www.cif.org/sites/cif_enc/files/7._akram_waheed_breakout_country_experience.pdf

	Governance and Monitoring: The Maldives is also committed to good governance and monitoring, as it has set up the new Climate Finance Hub under the Ministry of Finance. Their success in delivering their programs is based on this centralized surveillance, frequent technical and regulatory training, engagements, and participation of stakeholders, as well as data-oriented policy support. **Innovations**: Ongoing investments in off-grid and distributed renewable solutions, credit schemes for households and small enterprises, and targeted gender/SDG impacts. **Constraints**: Persistent project-level implementation, local government capacity gaps, high transaction costs, and a continuing need for robust adaptation finance mechanisms. **Institutional Capacity:** ● Policy leadership is given by the Ministry of Climate Change, Environment and Energy, although the capacity of technical staff is weak. ● The experience with hybrid mini-grids has been gained by utilities (STELCO, FENAKA) that require assistance in O&M and scale-up. ● The regulatory structures are changing; the political issues of tariff reforms are delicate. ● Small scale and reliance on donor TA limit institutional resilience. ● The Energy Roadmap also emphasizes strengthening regulatory capacity and improving access to reliable energy data as prerequisites for scaling private and concessional investment.
Challenges	**Land constraints** limit the feasibility of large-scale renewable energy deployment. **High grid infrastructure costs** due to reliance on subsea cables for inter-island connectivity. **Limited technical and institutional capacity to scale RE technologies,** with few local firms, unstreamlined regulatory processes, and no centralized knowledge-sharing platform.
Opportunities	**Provide technical assistance, capacity building, policy advocacy about energy transition (RE, BESS, EE, micro/mini-grid) for government and private sectors**.

1.5 Nepal

Table 5: Nepal Country Diagnostic

Topic	Details
Demographic	Nepal's population is 29.6 million in 2024, projected to reach 34.8 million by 2051. The working-age group (15–64) rises from 65.3% to 66.9% by 2030, signaling a rising energy demand. By 2023, 94% had electricity access and 22.4% lived in urban areas.
Socio-economic	GDP reached USD 42.9 billion in 2024, with industry contributing USD 1.87 billion (4.4 %). Despite growth in output, the industrial share of GDP declined.
GHG emission	Net GHG emission was 38.2 $MtCO_2$/yr including the carbon sink -20.0 $MtCO_2$/yr from forest $MtCO_2$/yr (2022)[47] GHG emissions were 25.0 $MtCO_2$/yr (65.2%) from the energy sector, 4.8 $MtCO_2$/yr (12.6%) from IPPU, 3.6 $MtCO_2$/yr (9.4%)from AFOLU, and 4.8 $MtCO_2$/yr (12.6%) from waste.
Climate vulnerability	Nepal ranks 130th globally and 5th regionally for disaster risk. Climate change threatens water flows and hydropower, potentially costing 0.1% of GDP annually. Adapting water and energy systems to climate change may require USD 5.35 billion by 2050.[48]
Climate policy	National Climate Policy (2019) National Adaptation Plan (NAP) 2021 – 2050 (2021) NNepal's Long-term Strategy for Net-zero Emissions (2021)[49] Nepal's First Biennial Transparency Report (BTR) to the UNFCCC (2025) NDC 3.0 (2025)[50]
Energy policy	Energy Development Roadmap & Action Plan National Energy Efficiency Strategy, 2075 (2019) Nepal's Electricity Development The Sixteenth Five-Year Plan (2024/25–2028/29) Green Hydrogen Policy (2024)
Net-zero target	Nepal has set a net-zero target by 2045. The country mitigation strategies include: **Energy:** (i) expand mini- and micro-hydropower, solar, wind, and bioenergy; (ii) reduce transmission and distribution losses; (iii) scale up electric cookstoves; (iv) expand household and large-scale biogas use; (v) expand electricity-based furnaces for the iron and steel industry; (vi) promote bioenergy in the cement industry; (vii) promote electricity-based boilers for industrial use; (viii) improve brick production efficiency. **Transport:** (i) increase BEV adoption for private and public transport; (ii) develop electric public-transport networks. **IPPU:** (i) improve cement production efficiency. **AFOLU:** (i) improve natural resource management; (ii) maintain sustainable forest management.

[47] Ministry of Forests and Environment, Government of Nepal (2025). Nepal First Biennial Transparency Report (BTR1). Available at: https://unfccc.int/sites/default/files/resource/Nepal_First_BTR.pdf
[48] Ministry of Forests and Environment, Government of Nepal (2021). National Adaptation Plan (NAP) 2021–2050. Available at: https://unfccc.int/sites/default/files/resource/NAP_Nepal_2021.pdf
[49] Government of Nepal (2021). Nepal's Long-term Strategy for Net-zero Emissions (LT-LEDS). Available at: https://unfccc.int/sites/default/files/resource/NepalLTLEDS.pdf
[50] Government of Nepal (2025). Nationally Determined Contribution (NDC) 3.0. Available at: https://unfccc.int/sites/default/files/2025-05/Nepal%20NDC3.pdf

Energy status	**Coal phaseout**	"A Coal Exit Program" aims to deactivate coal plants by 2030 and full phase out by 2045. The policy is under development, planned to be announced by 2028.
	Renewable	Nepal targets 5,000 MW of clean energy by 2030 under its unconditional goal and 10 to 15 % of 15,000 MW from wind, solar, or bioenergy under the conditional target. As of 2023, total renewable capacity reached 2,799 MW, mostly from hydropower, with only 122 MW from non-hydro sources, suggesting that while the unconditional target is likely achievable with steady growth, the conditional target remains a significant challenge. As of 2024, Nepal's installed capacity includes 2,990 MW of hydropower, 107 MW of solar, and 6 MW of bagasse-based generation. Nepal's NDC 3.0 signals a major scale-up in electricity generation capacity by 2030 and 2035, with a growing role for non-hydro renewables within the overall target..[51]
	Green hydrogen	Nepal plans to use green hydrogen and green ammonia to replace fossil fuels and fertilizer imports. Feasibility studies and pilots are planned for 2025–2027, with deployment after 2029 and commercial scale-up post-2036.[52]
	Grid development	Nepal aims to cut T&D losses from 12.73% in 2023 to 10.5% by 2035, [53] increase substation capacity from 13,050 to 40,000 MVA, and expand transmission lines to 17,446 circuit-km by 2035.
	Cross-border energy trade	Nepal imports electricity from India during the dry season, exports in the wet season, and has agreed to export 40 MW to Bangladesh. Stakeholders called for a rules-focused regional forum involving ministries, regulators, and utilities to accelerate readiness through harmonized CBET rules, scheduling, and settlement approaches.
	Energy storage options	Nepal has small-scale storage hydropower in operation and the 140 MW Tanahu project under construction. PHS projects like the 332 MW Syarphu Lake are in feasibility stages. BESS remains limited to solar microgrid pilots. Consultations further highlighted that Nepal's storage market is constrained not only by project pipelines but also by tariff and market-design gaps for batteries and storage services, suggesting a need for regional peer learning on storage remuneration models and grid services.
	Knowledge and peer learning platforms	NREP: Government–UK programme supporting renewable energy access and private investment. NEEP: Government–GIZ programme promoting energy efficiency in industry and buildings.
Industry	**Energy efficiency**	The country targets to double their energy efficiency from 0.84% per year to 1.68% per year by 2030. [54] Nepal's energy efficiency efforts focus on raising awareness, building institutional frameworks, setting standards, and reducing energy imports.
	Industrial decarbonization	Nepal does not yet have a dedicated policy for industrial decarbonization

[51] Institute of South Asian Studies (ISAS), National University of Singapore (2024). Nepal's Impressive Progress in the Hydroelectricity Sector. Available at: https://www.isas.nus.edu.sg/papers/nepals-impressive-progress-in-the-hydroelectricity-sector
[52] Global Green Growth Institute (2025). Green Hydrogen Roadmap for Nepal. Available at: https://gggi.org/report/green-hydrogen-roadmap-for-nepal/
[53] SARP (n.d.). Website (source title not retrievable from the provided URL). Available at: http://ww1.sarpf.org/
[54] Government of Nepal, Ministry of Energy, Water Resources and Irrigation (2019). National Energy Efficiency Strategy, 2075 (Unofficial translation; approved by Cabinet on 19 November 2018). Available at: https://policy.asiapacificenergy.org/sites/default/files/National%20Energy%20Efficiency%20Strategy%2C%202075%20%282019%29%20%28EN%29.pdf

Transport	**E-mobility**	Nepal aims to increase EV adoption, targeting 90% of private passenger vehicle sales and 60% of public vehicle sales by 2030. Despite rapid growth in EV adoption driven by Chinese BEVs, EVs accounted for less than 2% of Nepal's vehicle fleet in 2023.[55]
Potential co-benefits	**Nature-based energy solutions**	Watershed management: Demonstrated in Nepal's Kali-Gandaki basin to reduce sedimentation and improve hydropower reliability.[56] Green roofs & passive cooling: Piloted in Kathmandu; shown to reduce indoor temperatures and mitigate urban heat island effects.[57]
	Disaster resilience	Energy diversification such as expanding micro-scale solar-BESS integration, hydro power storage, and regional power trade reduces reliance on hydropower.
	Employment	ICIMOD estimates that hydropower, solar, and biogas in Nepal can generate over 9,798, 32,064, and 1,068 green jobs, respectively.
	Climate prosperity and climate justice	Micro-hydro and solar-BESS microgrids can significantly improve clean energy access in Nepal's rural areas.
Finance Landscape & availability	**Public and Donor Finances:** The renewable energy sector of Nepal is largely based on government finance, subsidized loans, and massive bilateral/multilateral funding. The presence of the major players like the World Bank, ADB, UK/FCDO, IFC/BII/Metlife, etc, has played a crucial role**.** The stability and potential of the sector can be seen in landmark financing projects such as the first Nepal green bond (NMB Bank, 60 million anchors, 2025) and the Sustainable Energy Challenge Fund (SECF), as well as several projects based on climate-related characteristics. This stability is further supported by the government's growing share of hydropower and the expansion of grids despite the difficulty of low domestic revenue. **Private Sector Participation**: NMB Bank and AEPC (Central Renewable Energy Fund) are not just players, but catalysts in the renewable energy landscape. Their involvement in mobilizing private capital in community-based micro-hydro, solar, electric transport, and distributed renewable energy is a notable progress. Viability gap funding, guarantee structures, and publicly managed challenge funds are beginning to win over private investors, showing Nepal's brighter renewable energy future. **Innovations:** The renewable energy sector is seeing innovative financing structures being developed. Green bonds, blended finance, integration of microfinance institutions, and collaboration are becoming popular. The partnerships with the local banks and the SECF are remarkable as they open the doors to rooftop solar, productive use, and distributed assets**.** **Barriers**: Despite the progress, Nepal's renewable energy sector has challenges. Seasonal surplus/deficit issues and climate impacts pose significant investment risks. Moreover, policy gaps around market access, land, and regulatory efficiency are restraining the scale-up of renewable energy projects. **Finance Availability & Gaps:** ● Energy transition investment requirements of USD 3.4 billion annually, with huge disparities in non-hydro RE. ● INFF Financing Strategy (2025- 2030) emphasizes green bonds, diaspora financing, and blended finance (UNDP, 2025). ● The support is good through donor/IFI (World Bank, ADB, EU, GCF), particularly transmission and CBET. ● There is an increase in investments in hydropower by the private sector; however, the financing of solar/wind is not extensive.

[55] ISET-Nepal (2024). Electric Mobility in Nepal. Available at: https://isetnepal.org.np/wp-content/uploads/2024/11/Electric-Mobility_compressed.pdf
[56] World Bank (2019). Valuing Green Infrastructure: Case Study of Kali Gandaki Watershed, Nepal. Available at: https://documents1.worldbank.org/curated/en/422301574090916059/pdf/Case-Study-of-Kali-Gandaki-Watershed-Nepal.pdf
[57] Pradhan, A.S., and Lamsal, P. (2021). Thermal Performance of Green Roof in Residential Buildings of Kathmandu Valley. Proceedings of the 10th IOE Graduate Conference (Vol. 10, October 2021). Available at: https://conference.ioe.edu.np/ioegc10/papers/ioegc-10-060-10082.pdf

Institutional readiness & capacity	**Policy Framework**: Nepal's roadmap (Energy Development Roadmap 2081, 16th National Plan, net-zero 2045) is ambitious, aiming for 100% electrification, 28,000 MW installed capacity by 2035, and a 10% renewables (non-hydro) target by FY29. **Regulation and Governance:** The Electricity Regulatory Commission (ERC), which was founded in 2019, is making strides towards an independent, transparent regulation, such as market entry, tariffs, and technical standards. The independence of ERC and the current reinforcement of the decision-making autonomy are reasonable indications of the future of the energy sector in Nepal. **Technical Capacity:** ERC, AEPC, and sector stakeholders actively participate in focused capacity building. International collaboration with FSR Global and the introduction of new digital regulatory frameworks. These efforts encourage the future of Nepal's energy sector despite the huge human and technical gaps, particularly at the subnational levels. **Planning and Coordination**: Inter-ministerial, federal, provincial, and local coordination remains inconsistent, a significant challenge for project implementation and private sector confidence. Long project cycles, land use, and environmental permitting remain obstacles. **Capacity Building**: The ramping up of programs for regulator staff, technical planners, and subnational administrators through national and international partnerships strongly indicates the commitment to the future of Nepal's energy sector. **Risks**: Implementation is delayed by bureaucratic inefficiency, slow procurement, climate risks, and chronic underinvestment in grid/distribution modernization. I**nstitutional Capacity** ● MoEWRI and NEA are powerful but hydro-centric; no significant solar, wind, or storage capacity. ● AEPC has experience in distributed RE and clean cooking, and its resources are stretched. ● The regulatory regimes of CBET are changing, and the trilateral accords with India and Bangladesh are developing. ● There is still a problem of institutional coordination between the Central Government agencies and provinces.
Challenges	**Unstable political situation:** current protests could slowdown progress or investment plans for energy transition-related projects. **Vulnerable to power shortage:** insufficient electricity supply during dry season and reliance on import **Regional trade infrastructure:** limited financing for interconnections
Opportunities	**Enhance self-sufficiency through solar-BESS and microgrid integration**, supported by capacity building and investment-friendly policies. **Leverage regional interconnections for seasonal balancing** via policy advice, transaction facilitation, negotiation skills and documentation and stakeholder engagement.

1.6 Pakistan

Table 6: Pakistan Country Diagnostic

Topic	Details	
Demographic	In 2024, Pakistan's population reached 251 million, with 59.4% in working age and electricity access at 95.6%. By 2030, the population will hit 281 million and the working-age share 61.1%, indicating a rising energy demand.	
Socio-economic	GDP reached USD 373 billion in 2024, with industry contributing USD 48.9 billion (13.1%). While overall GDP continued to grow, industrial output and its share of GDP showed fluctuations.	
GHG emission	The total GHG mission in 2022 was 521.46 $MtCO_{2e}$. GHG emissions were 213.28 $MtCO_2e$ (40.90%) from the energy sector, 31.98 $MtCO_2e$ from IPPU (6.13%), 243.76 $MtCO_2e$ from AFOLU (46.75%), and 32.44 $MtCO_2e$ from waste (6.22%).	
Climate vulnerability	Pakistan ranks 10th globally and 3rd in the region for disaster risk, with frequent exposure to earthquakes and floods. Annual losses average USD 1.3 to 3.8 billion, with floods accounting for 75% of the damage.[58]	
Climate policy	National Climate Change Policy (NCCP) Updated NDC 2021[59]	
Energy policy	Alternative & Renewable Energy Policy 2019 Indicative Generation Capacity Expansion Plan (IGCEP) 2021 – 30 National Energy Efficiency & Conservation (NEEC) Policy 2023[60] Pakistan's National Energy Efficiency & Conservation Policy 2023 provides a policy basis for cross-sector EE implementation and prioritizes buildings, industry, and transport as strategic sectors.	
Net-zero target	Pakistan has set a net-zero target by 2050. The mitigation strategies are provided by topics as follows: ● **Renewable energy:** expand capacity, including hydropower, to reach 60% of the energy supply. ● **Transportation:** promote 30% EV use. ● **Coal:** maintain the 2020 moratorium and shelve plans for two new coal power plants. ● **Land use & forestry:** continue investing in nature-based solutions through afforestation programs.	
Energy status	**Coal phaseout**	Moratorium on new coal power plants and ban on imported coal for power generation since 2020, but no timeline for full coal phaseout specified.
	Renewable	Pakistan targets 60% renewable energy by 2030. As of 2024, thermal sources still dominate with 28.8 GW (62%) of installed capacity, including 7.3 GW (16%) from coal, while renewables account for 13.5 GW (31%) comprising 10.6 GW (23%) hydropower, 1.8 GW (4%) wind, and 1.1 GW (2%) solar.[61]
	Green hydrogen	Pakistan has not fully integrated green hydrogen into national plans due to limited economic viability. NEECA studies indicate most scenarios are only viable under favorable conditions, such as zero-cost curtailed power

[58] Asian Development Bank and World Bank (2021). Climate Risk Country Profile: Pakistan. Available at: https://www.adb.org/sites/default/files/publication/700916/climate-risk-country-profile-pakistan.pdf
[59] UNFCCC (2021). Pakistan Updated NDC 2021. Available at: https://unfccc.int/sites/default/files/NDC/2022-06/Pakistan%20Updated%20NDC%202021.pdf
[60] National Energy Efficiency and Conservation Authority (NEECA), Government of Pakistan (2023). National Energy Efficiency and Conservation (NEEC) Policy 2023. Available at: https://data.sbfnetwork.org/sites/default/files/NEEC%2520Policy%25202023-1%2520%281%29.pdf
[61] Renewables First (2025). Pakistan Electricity Review 2025. Available at: https://uploads.renewablesfirst.org/Pakistan_Electricity_Review_2025_89f0b613d6.pdf

		and high carbon taxes. However, a pilot project by Oracle Power in Sindh, targeting 55,000 tons of production, is underway but not yet commissioned.
	Grid development	Pakistan's grid faces high T&D losses (18.08% vs NEPRA's 12.15% target[62]) and rising pressure from net-metered solar, [63] yet lacks a clear public plan for grid development.
	Cross-border energy trade	Although Pakistan and India signed MoUs around 2014 and explored electricity imports of 500–1,200 MW, no large-scale cross-border power trade has materialized, mainly due to political tensions and implementation delays.
	Energy storage options	In Pakistan, most battery storage is deployed behind the meter, paired with rooftop solar in residential, commercial, and industrial settings. While this improves reliability for users, it can increase stress on the national grid and delay cost-effective grid modernization.[64] Additionally, the country has no operational large-scale PHS and no active cross-border electricity trade with India.
	Knowledge and peer learning platforms	Pakistan does not currently have a centralized, government-run energy transition-related topics (RE, EE, hydrogen) knowledge-sharing platform. Topics are provided to organizations such as NEECA, which is responsible for energy efficiency, EV, and hydrogen.
Industry	**Energy efficiency**	The national energy efficiency and conservation policy aims to reduce this by 9 MTOE of their BAU primary energy consumption, cutting GHG emissions by 35 $MtCO_2e$ by 2030. Stakeholders emphasized that Pakistan's demand-side opportunity is especially large in cooling and buildings, with DSM measures (efficient fans, AC standards, building retrofits, and enforcement capacity) critical for reducing peak demand stress.
	Industrial decarbonization	Pakistan targets 2.3 MTOE energy savings and 8.97 $MtCO_2$ reduction in industry by 2030 through energy audits, efficient boilers (by 2026), IE2+ motors (by 2027), and furnace upgrades (by 2028).
Transport	**E-mobility**	Pakistan aims 30% of EV penetration by 2030. Although the country offers tax incentives for EV buyers, manufacturers, and charging infrastructure, EV adoption remains low: only a few hundred electric cars and approximately 40,000-45,000 electric bikes were produced in 2024-25.[65]
Potential co-benefits	**Nature-based energy solutions**	Passive cooling: In building codes and green guidelines; adoption slow due to weak enforcement and limited finance. Agri-PV: High potential in Punjab/Sindh; adoption low, mainly used for solar irrigation pumps; few pilots, no large-scale agrivoltaics yet.
	Disaster resilience	Decentralized RE + BESS: Provide backup during floods, heatwaves, and grid failures. Watershed restoration: Strengthen water security for hydropower and irrigation, while reducing flood risk.

[62] Energy Update (2025). Transmission and Distribution (T&D) Losses in Pakistan. 16 March 2025. Available at: https://www.energyupdate.com.pk/2025/03/16/transmission-and-distribution-td-losses-in-pakistan/
[63] Institute for Energy Economics and Financial Analysis (IEEFA) (2025). Net metering reforms and grid challenges amid Pakistan's solar rise. 22 April 2025. Available at: https://ieefa.org/resources/net-metering-reforms-and-grid-challenges-amid-pakistans-solar-rise
[64] Institute for Energy Economics and Financial Analysis (IEEFA) (2025). Battery storage and the future of Pakistan's electricity grid. 5 June 2025. Available at: https://ieefa.org/resources/battery-storage-and-future-pakistans-electricity-grid
[65] Eco-Business (2025). Can EVs help break Pakistan's fossil fuel dependency? 21 August 2025. Available at: https://www.eco-business.com/news/can-evs-help-break-pakistans-fossil-fuel-dependency

	Employment	Under the IGCEP pathway, around 3,700 MW of wind and 7,500 MW of solar PV could create over 105,000 direct jobs by 2030.[66]
	Climate prosperity and climate justice	Pakistan's transition plan emphasizes solar (utility + rooftop) with BESS, wind, large hydro, and small/micro hydro, strengthening energy and water resilience while creating green jobs.
Finance Landscape & availability	**Public and Donor Finance**: Pakistan remains highly dependent on multilateral and donor flows (World Bank pledged $20 billion over the next decade), GCF, AIIB, ADB, and new plans for sovereign green sukuk to finance hydropower and renewables. Domestic capital is limited by credit risk, currency devaluation, and sector inefficiencies. **Domestic Financial Sector**: The State Bank plays a crucial role in the domestic financial sector, providing specialized refinancing schemes (up to Rs 6 billion for RE projects, tenures of up to 12 years at concessional rates), which commercial banks further supplement. However, credit for RE has not yet scaled to address the large market. **Private Sector**: The private sector has significant potential for investment in decentralized renewable energy projects. Currently, private investment is mainly decentralized for solar, and storage (notably rooftop) are largely self-financed. However, barriers include policy risk, delays in offtake payments, and grid connections and PPAs challenges. **Innovative Finance**: There is a pressing need for innovative finance solutions. Plans to launch Panda Bonds and Green Sukuk (domestic and international) in 2025 aim to crowd in new capital, diversify away from expensive Eurobond debt, and develop sustainable investment instruments. **Obstacles:** Despite the improvements, it is essential to note that there are policy inconsistencies, sudden subsidy/tariff shifts, circular debt, and political risk. The lending to grid-scale renewables is still risky because of a low credit rating (S&P CCC+) and delays in payments made by the public sector. This highlights the need to act and change the enabling conditions in financing renewable energy in Pakistan. **Finance Availability:** • By 2030, NDC (2021) needs USD 101 billion to undertake energy transition, and 35% of this will depend on international funding (UNDP, 2023). • Power Distribution Strengthening Project (2024) of ADB and GCF pipelines offers concessional finance. • Domestic banks are risk-averse; green finance products (bonds, insurance) are developed in the Green Banking Guidelines of the SBP.	
Institutional readiness & Capacity	**Policy Framework:** The National Electricity Policy (2021) is a ray of hope, as it is a clear guideline towards sustainability, energy security, affordability, and open participation by the private sector. The framework's structure, supporting integrating distributed generation, new market mechanisms (CTBCM), and transparent competitive procurement, provides an encouraging way forward. **Regulation and Structure**: NEPRA, the independent regulator, is continuously empowered for tariffs, licensing, performance oversight, and market development. Sector entities (WAPDA, NTDC, DISCOs) are constantly being reformed, with legacy capacity payments and subsidy policies actively addressing major off-taker and payment risks. **Technical Capacity**: The rapid deployment of decentralized solar and batteries is driving innovation, but grid planning, technical integration, and fair cost allocation (especially for poor/non-grid users) are bottlenecked by legacy system design, skills gaps, and disjointed planning between federal and provincial agencies.	

[66] World Bank (2022). Renewable Energy Jobs and Sector Skills Mapping for Pakistan. Pakistan Sustainable Energy Series. Available at: https://documents1.worldbank.org/curated/en/099825005082283600/pdf/P169313006705f0a10811d043b943d9b4ca.pdf

	Governance and Reform: Multiple anti-theft measures, energy efficiency audit programs, and utility restructuring plans exist, including new directions for PPPs, open access, and solar net-metering. However, bureaucratic inefficiency, misaligned incentives, and underinvestment in grid modernization persist. **Innovation:** The regulatory landscape is becoming increasingly fruitful in innovation, and green finance, blended finance pilots, competitive procurement, and trading platforms are being introduced. Although uncertainty and lack of technical control can slow the development of new developments, the potential of innovations cannot be ignored. **Risks**: Macro instability, payment uncertainty, and lack of political insulation for regulators undermine long-term planning and private sector confidence. **Institutional Capacity:** ● The Ministry of Energy and NEPRA offer policy and regulatory supervision, which is lax. ● The system losses of DISCOs (16.5% average) and the collection rates are low. ● Institutional reforms are in progress, but slow; payment delays discourage private investment. ● Distributed RE and storage integration capacity is low.
Challenges	**No Cross-Border Trade:** Pakistan has no power trade agreement with India, unlike Nepal, Bhutan, and Bangladesh. **Grid Isolation:** Not part of South Asia's regional power grid, limiting access to regional surplus. **Higher Balancing Costs:** Without imports, Pakistan relies on costly domestic options like large hydro, BESS, or PHS and fossil-fuel based powerplants. Demand growth from inefficient cooling loads and weak building energy performance standards increases peak stress on the grid; the Energy Conservation Building Code 2023 is a key reform lever but requires enforcement capacity and market readiness.
Opportunities	**Capacity building and technical assistance to scale up renewable energy and grid development**, alongside support for engaging foreign investors through incentives and relaxed regulations such as allowing 100% foreign ownership.

1.7 Sri Lanka

Table 7: Sri Lanka Country Diagnostic

Topic	Details
Demographic	As of 2024, Sri Lanka has a population of 21.9 million, projected to reach 23.8 million by 2031 and 24.8 million by 2051. The working-age population (15–64) is 65.8%, slightly declining to 65.6% by 2030. Electricity access reached 100% by 2023, with 19% living in urban areas.
Socio-economic	In 2024, GDP stood at USD 98.9 billion, with industry contributing USD 17.4 billion (17.6%). Total GDP, industrial output, and the industry's share of GDP have shown fluctuations.
GHG emission	In 2021, the national GHG emission was 28.9 $MtCO_2$/yr and the net GHG emission including LULUCF was 19.1 $MtCO_2$/yr.[67]. The absolute GHG emissions comprising 21.7 $MtCO_2$/yr (75.0%) from the energy sector, 6.1 $MtCO_2$/yr (21.0%) from agriculture, 0.5 $MtCO_2$/yr (1.8%) from IPPU, and 0.7 $MtCO_2$/yr (2.3%) from waste. LULUCF removed 9.9 $MtCO_2$/yr as a carbon sink.
Climate vulnerability	Sri Lanka ranks 77th globally and 4th in the region for disaster risk. Floods cause annual losses of about USD 140 million, mainly affecting agriculture, housing, and infrastructure. Rising temperatures are expected to increase electricity demand and disrupt hydropower due to shifting rainfall and water availability.[68]
Climate policy	Carbon Net Zero 2050 Roadmap and Strategic Plan (2023) Sri Lanka's NDC 3.0 (2026 - 2035)[69]
Infrastructure policy	Long Term Generation Expansion Plan 2025 – 2044 (2025)[70]
Energy policy	National Energy Policy & Strategies (2019): Provides an overarching energy framework with clear institutional mandates and implementation mechanisms. The energy policy and tariff structures are being updated and will be finalized in 2026. Draft National Policy on Renewable Hydrogen (2025): Charts Sri Lanka's plan to tap ~16 GW solar and >50 GW wind to develop a renewable hydrogen ecosystem for industry, fuels, and storage. Sri Lanka National Hydrogen Roadmap (2024/2025): Sets 2030 hydrogen targets, priority pilots, safety standards, and export-oriented pathways, positioning Sri Lanka as a regional hydrogen hub. JET Study & INFF Strategy (2025): UNDP-supported initiatives guiding a fair energy transition and mobilizing finance, aligned with hydrogen policy implementation.
Net-zero target	Sri Lanka aims for a net-zero target by 2050. The highlighted mitigation activities include: • **Energy:** (i) reduce power-sector GHG emissions while maintaining the 70% RE target; (ii) add no new coal capacity and use natural gas as a complementary resource; (iii) cut electricity demand by promoting energy-efficient technologies and systems. • **Transport:** (i) increase the share of public transport; (ii) improve vehicle emissions performance.

[67] Government of Sri Lanka (2024). First Biennial Transparency Report (BTR1) of Sri Lanka. Available at: https://unfccc.int/sites/default/files/resource/First%20Biennial%20Transparancy%20Report%20-%20Sri%20Lanka%20-%202024.pdf
[68] Asian Development Bank and World Bank Group (2021). Climate Risk Country Profile: Sri Lanka. Available at: https://www.adb.org/sites/default/files/publication/653586/climate-risk-country-profile-sri-lanka.pdf
[69] Government of Sri Lanka (2025). Sri Lanka's Nationally Determined Contributions 3.0 (2026–2035) (submitted September 2025). Available at: https://unfccc.int/sites/default/files/2025-09/Sri%20Lankas%20Nationally%20Determined%20Contributions%203.0%20%282026-2035%29%20submitted%2022.09.2025%20%281%29.pdf
[70] Ceylon Electricity Board (2025). Long Term Generation Expansion Plan (LTGEP) 2025–2044 (final report). Available at: https://www.ceb.lk/front_img/img_reports/1748839124LTGEP-2025-2044-FINAL_c.pdf

	• **Industrial:** (i) promote the circular economy; (ii) convert industrial and commercial refrigeration to low-GWP refrigerants. • **Waste:** reduce GHG emissions from the waste sector. • **Carbon removal:** (i) increase sustainable forest cover; (ii) enhance blue-carbon and CCUS initiatives. • **Cross-cutting:** promote nature-based solutions (NBS).	
Energy status	**Coal phaseout**	Sri Lanka has committed to not building any new coal power plants but has not specified a date for phasing out existing coal generation.
	Renewable	Sri Lanka targets 70% renewable electricity by 2030, with 2,199 MW of new RE planned between 2023 and 2042. As of 2024, capacity is led by hydropower (1,965 MW, 32%), solar (1,579 MW, 26%, mostly rooftop), wind (267 MW, 5%), and biomass (54 MW, 1%). Although coal makes up just 900 MW (15%) of capacity, it generates 34% of electricity; thermal accounts for 15%.
	Green hydrogen	Sri Lanka has established a draft national policy and roadmap to develop a renewable hydrogen economy by 2030, including investment incentives and technology partnerships. However, a specific hydrogen production capacity target for 2030 has not yet been confirmed.
	Grid development	The country has constructed new transmission and distribution lines, upgraded and modernized the existing grids; however, more attention/investment is required to reduce the grid losses and make the grid ready for power wheeling etc.
	Cross-border energy trade	Sri Lanka and India plan a 1,000 MW HVDC interconnection between Madurai and Mannar, developed in two phases of 500 MW each. Phase 1 is estimated at USD 1.225 billion. Technical details for Phase 2, including potential subsea components, are still under discussion[71]
	Energy storage options (battery, pump, regional grids)	During 2023 – 2042, the country plans to add 100 MW of stand-alone BESS and 200 MW of solar BESS integrated plants. The first PHS, Maha Oya pumped storage station (600 MW) is under feasibility study.
	Knowledge and peer learning platforms	SLSEA: government body for renewable energy, efficiency, and conservation, sharing statistics, policies, and project updates.
Industry	**Energy efficiency**	Sri Lanka targets increasing 20% of energy efficiency from BAU by 2030.
	Industrial decarbonization	The country aims to reduce GHG emission in the industrial sector by ~7% by 2030.
Transport	**E-mobility**	Sri Lanka aims to convert 10% of its vehicle fleet to electric vehicles by 2030. As of 2023, Sri Lanka had about 4,200 EVs and 900 electric motorcycles registered. Although EV buyer incentives exist, adoption remains low largely because of inadequate charging infrastructure and related concerns.[72]
Potential co-benefits	**Nature-based energy solutions**	Green roofs and passive cooling are technically feasible in Sri Lanka, offering energy and carbon savings, but adoption is limited by cost, lack of incentives, structural concerns, and low awareness.

[71] Lanka News Web (2025). Sri Lanka-India Power Link Moves Ahead with Key Grid Connectivity Plans (6 July 2025). Available at: https://lankanewsweb.net/archives/97092/sri-lanka-india-power-link-moves-ahead-with-key-grid-connectivity-plans/

[72] ReGlobal (2023). Decarbonising Transport: Overview of Sri Lanka's EV market (26 August 2023). Available at: https://reglobal.org/decarbonising-transport-overview-of-sri-lankas-ev-market/

		Watershed management improves water security and hydropower performance, but scaling faces land use, funding, and coordination challenges.
	Disaster resilience	Decentralized RE + storage reduces grid reliance and blackouts, while smart grids improve disaster resilience and speed up recovery.
	Employment	The energy transition in Sri Lanka is expected to create green jobs through electrification, renewables, and efficiency, but no official estimate quantifies the total yet.
	Climate prosperity and climate justice	Sri Lanka is expanding solar, wind, and storage to cut fossil fuel imports and enhance energy security. Rooftop and off-grid RE reduce grid reliance, while green job demand is rising. High import costs are accelerating the shift to low-carbon solutions
Finance Landscape	**Public/Donor Finance**: The World Bank's recent $150 million program (2025) is a game-changer, supporting 1 GW of solar, wind, and grid upgrades. With its potential to target over $800 million in private capital, which uses $40 million in guarantees to de-risk payment for IPPs and investors, the program is an important milestone. InfraCo (PIDG) and other development finance initiatives are strengthening the rooftop solar platform and mobilizing co-funding, further fueling this optimism. Stakeholders highlighted that attracting larger-scale international investment increasingly depends on credible payment-security and guarantee mechanisms, alongside competitive procurement and grid readiness **Domestic Capital**: Fiscal constraints have persisted post-crisis, but the resilience of the renewable energy sector is evident in the gradual improvement in macro fundamentals (S&P at CCC+ in mid-2025), and the role of new private sector innovations (Greenpower SL/PIDG, rooftop solar scaling, energy parks) in catalyzing new investment. This should reassure stakeholders about the sector's ability to adapt and thrive. **Private Sector:** RE investments connected to the grid have grown in scale, but large-scale projects are prone to land, transmission, and credit risk (because CEB has a poor balance sheet). Nevertheless, the increasing importance of rooftop solar, competitive bidding of new RE projects, and the involvement of the private sector in EPC/investors are to be taken positively, as they promise a positive future for the industry. **Innovations**: The National Green Energy Acceleration Plan 2025–2030 plays a key role in identifying digitalization, cost, and efficiency improvements, as well as public-private/civil society engagement, as central to future scale-up. Green bond and blended finance pilots are under design to support these initiatives. **Risks**: The absence of competitive procurement mechanisms for some RE resources, the limited central registry for grid access, and the challenges of financial autonomy for regulators can disincentivize sustained private investment. **Finance Availability & Gaps:** ● An extreme fiscal crisis limits national funding, and the dependence on IFIs is significant. ● The USD 150 million program (2025) by the World Bank Group is meant to mobilize USD 800 million in RE through private investment. ● ADB has a Small Expenditure Financing Facility (2024) that encourages grid integration and RE sustainability. ● UNDP has developed an INFF Strategy (2025) through which domestic and international finance can be aligned.	
Institutional capacity	**Policy Framework**: Sri Lanka's Sustainable Energy Authority (SLSEA) is the apex institution for RE/Energy Efficiency, supported by the Energy Act, the CEB, and an evolving regulatory environment (PUCSL). Their policy ambitions are well-articulated, and they want to be 70% RE by 2030, net-zero, and a five-year Green Energy Acceleration Plan shows our commitment to sustainable energy. **Regulatory Structure:** Nonetheless, the new draft reforms, which may jeopardize the independence and financial autonomy of PUCSL, may have the following consequences: Duplication of mandates (PUCSL, NEAC, System Operator) poses a threat of	

	institutional overlaps and loss of power by regulators to set tariffs, issue licenses, and technical planning. The independence of the System Operator is still debatable, with suggestions of checking it by parliament to prevent political influence. **Technical capacity**: Despite the challenges, technical innovation has made significant progress. Grid modernization, integrated transmission planning, and competitive procurement for RE projects are underway. The lack of skills in planning and operational levels is still an issue, yet there is an opportunity to grow and improve. The slow pace of deployment of technical innovation, e.g., floating solar, offshore wind, and energy storage, has been slowed by sluggish regulatory approvals and little inter-ministerial coordination, but the tide is turning. **Innovation**: Institutionalization of public participation, social and gender-inclusive programming, and open access for project development have been strengthened. **Risks**: Risks include political/bureaucratic interference in procurement and approval, insufficient competitive tendering (resulting in higher than average RE costs), and a need for integrated long-term transmission and distribution planning to handle intermittent RE. **Institutional Capacity:** ● Central but stressed financially are the Ministry of Power & Energy and CEB. ● Regulatory authority (PUCSL) is effective yet politically limited. ● Institutional reforms (tariff changes, procurement modernization) are being undertaken with the donors' assistance. ● Hydrogen and just transition planning capacity are being developed, with the help of UNDP.
Challenges	**Coal and LNG lock-in:** Sri Lanka operates the Norochcholai coal plant and pursues LNG **Policy inconsistency:** Cancelled PPAs, reversed LOIs, and shifting procurement rules undermine investor confidence. **Weak incentives and bankability:** Delayed tariffs, unbankable PPAs, and limited guarantees deter private investment. **Aging grid:** Outdated, congested grid limits RE integration and lacks flexibility for variable generation. **Renewable integration:** Limited storage, poor forecasting, and grid inflexibility hinder solar and wind uptake. **EV rollout gaps:** EV growth is slow due to unclear permitting, weak incentives, and lack of charging standards.
Opportunities	**Support rooftop solar, BESS, and efficiency adoption in industry and buildings** through technical assistance and policy-enabling capacity building. **Facilitate blended finance for RE + storage in SMEs** and plantation sectors, drawing from IDCOL-style models. **Advise on grid modernization and RE integration**, including digital tools, forecasting, and storage pilots. **Assist coal transition and JETP readiness** via financial analysis, stakeholder engagement, and social safeguards. **Strengthen cross-border power planning** (e.g. India–Sri Lanka HVDC) through technical, regulatory, and market advisory.

2 Regional Synthesis and Links to Global Context

2.1 High-Level Barrier & Opportunity Synthesis

India and Nepal play a key role in South Asia's energy transition, making significant progress in renewable deployment and cross-border trade. Their achievements set a fast-moving example that motivates others in the region. The Maldives and Bhutan are also pursuing bold initiatives, solar and wind expansion in the Maldives and hydropower growth in Bhutan, but both remain financially dependent on development and concessional finance. Bangladesh, Pakistan, and Sri Lanka face growing demand, financial stress, and pressure to accelerate clean energy implementation. Despite these differences, governments in the region have established challenging goals, with NDCs and net-zero pledges ranging from 2030 (Maldives) to 2070 (India).

While this country level analyses present a mixed picture of energy transition readiness, there is a clear deficit in all countries in financial resources, regulatory maturity and institutional capacity to implement the optimal levels of energy transition and support enabling environments that are required. Two regional dynamics are notable:

- The reliance on fossil fuels remains high, and coal and imported oil dominate in Bangladesh, India, Pakistan, and Sri Lanka.
- Hydropower and wind/solar-based energy potential in South Asia is creating momentum for transformation in energy security, trade potential and efficiency gains through cross-border trade.

- There is a presence of Nepal and Bhutan as exporters and Bangladesh and India as the large importers. This picture may change for the better in the future with new wind/solar, green hydrogen and other developments proposed in the region along with enhanced grid connections.

Table 8 attempts to summarize the potential areas for focus in each country according to broad parameters of policy ambition, market readiness, regulatory and technology maturity, and financing and capacity development priorities. Across the region, opportunities converge around support for distributed renewables (especially solar), storage, energy efficiency with an emphasis on efficient cooling, and cross-border trade, while paying attention to blended financing, NbS and DRR linkages in resilient energy infrastructure. To capitalize on these opportunities, strong policy signals and donor pipelines provide leverage; rapid uptake of rooftop PV, BESS pilots, and sectoral efficiency measures create replicable models; and existing regional channels (e.g., India–Nepal–Bangladesh trading corridors, BIMSTEC/SAARC fora, donor coordination mechanisms) can be used to scale standard templates, pooled procurement, and joint risk-sharing facilities. Energy efficiency, renewable energy potential and many other energy transition elements will increasingly find links with ecosystems, greening and cooling, and even extending to areas such as health and wellness, due to climate impacts.

Table 9 sets out some of the key challenges and key enablers facing each country, to round out the synthesis. Political ambition and demonstrable pilot activities exist in all seven countries, whether solar installations in rural areas or energy efficiency measures in urban centers. Yet progress remains

constrained by three interlinked challenges: regulatory clarity, system flexibility, and capital affordability. Regulatory and market design gaps (wheeling, distributed energy resources related rules, cross-border electricity trade or CBET frameworks) disproportionately raise transaction costs; infrastructure limits (grid congestion, limited ancillary services, island O&M) cap how much intermittent renewables can be absorbed; and fiscal or utility balance-sheet weaknesses make otherwise bankable projects hard to finance without guarantees or blended instruments. Institutional gaps are also apparent: regulators need stronger capacity on tariff design, ancillary services, and renewables integration; utilities require O&M and financial planning support; and banks need training to scale green lending.

During the consultations, the demand-side management and energy efficiency became the least-regret priority that is frequently more practical in the short term than large-scale generation additions, mainly in the area of cooling efficiency, building energy codes, industrial audits, and utility-led demand side management - DSM. Certain partners also emphasized the point that social protection and workforce transition planning are not fully developed in the current energy transition landscape and must find their more explicit expression in the stakeholder and program framing.

Beyond the conventional thinking of energy generation, transmission and distribution, countries may find that there are donors who are willing to support new and emerging areas related to climate prosperity and climate justice using the Paris Agreement, Global Biodiversity Framework, EU Green Deal, Sendai Framework for Disaster Risk Reduction, Nature-based Solutions etc. These angles could make the programming complex yet provide more program sustainability and new types of resources.

For UNOPS and SEforALL, the incremental value potentially lies in bridging identified finance gaps; standardizing policies and tools; and convening regional cooperation and knowledge transfer so that national ambitions can more quickly translate into credible, bankable project pipelines. Further, the integration of NbS, DRR and resilient infrastructure for future climate will also help countries to think broader and engage communities and corporations in the energy transition.

2.2 Global Context Relevant to the South Asia Energy Transition Initiative

The South Asia Energy Transition Collaborative Platform is conceived within the broader global momentum for achieving Sustainable Development Goal 7 (SDG7) - universal access to affordable, reliable, sustainable, and modern energy. An initiative by the Secretary General of the UN titled Sustainable Energy for All (SEforALL) has the broad outlines of this ambition and, as such, serves as the world platform mobilizing governments, development partners, and the business world to hasten the pace of clean energy access, efficiency, and deployment of renewable energy.

SEforALL's work is particularly relevant to South Asia, where political ambition for clean energy is high but the ability to translate ambition into bankable projects remains uneven and less than optimal. The program has promoted worldwide campaigns on universal access, energy efficiency, and integration of renewables, as well as establishing thematic programmes , including the Global Cooling Pledge, the Energy Compact process, and new ways to finance it. These global tools and approaches can be leveraged in South Asia to address persistent gaps in the region identified in this report: regulatory clarity, system flexibility, and affordable finance.

The experience of Southeast Asia ETP, which was designed in alignment with SEforALL's objectives, demonstrates the value of a regional platform that can help reduce transaction costs, coordinate donor finance, and standardize technical and regulatory approaches to the clean energy project development. Lessons of that model, including the necessity to convene regulators and utilities, to publish standardized templates, as well as to embed the principles of just transition, can be applied to South Asia with suitable adjustments to the specificities of the political economy, energy mix, and climate risks of the region.

By placing the Collaborative Platform in the context of the global SEforALL system, the South Asia Energy Transition will be able to ensure that it is not only in line with the international best practice but also that it will be more credible in the eyes of donors and financiers, as well as that it will not remain a marginal player but become a core contributor of the global transition to clean energy.

2.3 Towards Program Priorities for a South Asia Energy Transition Collaborative Platform

Regional Trend 1: Cross-Border Energy Trade

The geography of South Asia has its potential and limitations. Nepal and Bhutan produce excess hydropower, while Bangladesh, India, and Sri Lanka are experiencing increasing demand and incurring costs for fossil fuels. Yet physical interconnections remain patchy, and regulatory frameworks for banking, RE wheeling, and settlement are not harmonized. Political sensitivities and geographic barriers associated with mountainous terrain, island isolation, and fragile borders add complexity.

Opportunity: The seasonal balancing of hydro-rich and solar-wind-rich systems has considerable potential, improving the region's energy security. By significantly decreasing fossil imports, decreasing costs, and resiliency towards climate shocks, cross-border electricity trade (CBET) represents a promising future for the energy landscape in the region.

Proposed Recommendations for the Collaborative Platform:

- Act as a neutral convener of trilateral dialogues (India–Nepal–Bangladesh; India–Sri Lanka) to align CBET rules and settlement systems.
- Systematise and market cross-border PPAs and banking/wheeling models, approved by regulators, to minimize the transaction costs.
- Arrange with IFIs to mobilize interconnection infrastructure and risk-sharing instruments through blended finance.
- Endorse open MRV systems of traded electricity, facilitating credibility in climate reporting and donor congruence.
- Highlight the advantage of regional collaborations in terms of energy, food and economic security in the region, along with climate resilience.

Table 8: Heatmap of regional comparative analysis

Country	Policy ambition & targets	Market readiness & regulatory maturity	Regional value-add (cooling, storage, DRE)	Technology transfer, monitoring & joint financing	Capacity development priorities	Cooperation needs & high-level engagement
Bangladesh	Bangladesh has made significant strides in its renewable energy targets in the RE Policy update, 20% of 2030 Demand and 30% of 2040 Demand by RE, gradually increasing its commitment. This is further supported by the country's updated net metering and energy efficiency frameworks.	Rooftop solar on the commercial/industrial facilities is expanding following the Opex & Capex model, though utility-scale RE remains modest; grid-connected RE electricity wheeling and banking rules are evolving.	In Bangladesh, the potential of rooftop, utility-scale solar with battery storage is recognized as a key strategy to enhance Grid resilience and reduce peak demand. Additionally, opportunities in industrial efficiency and cooling are emerging.	Standardized Power Purchase Agreements (PPAs) and strong quality control of Photovoltaic (PV) and Battery Energy Storage Systems (BESS) are an urgent requirement. These actions can greatly de-risk projects and make their implementation successful.	Strengthening utility O&M, financial planning for distribution companies, tariff design, and green lending capacity in banks.	Trilateral power trade with India and Nepal; stronger donor coordination to de-risk investment pipelines.
Bhutan	Policy direction recognizes diversification beyond hydropower, with pilots in solar, wind, and a hydrogen roadmap.	Hydro institutions are strong, but regulation for non-hydro renewables is still at an early stage.	Hydro-solar hybrids and pumped storage can provide balancing services for the region.	Technology transfer on storage, ancillary services, and joint financing mechanisms with India are critical.	Training on grid codes, forecasting, and market operations; building regulatory capacity for new technologies.	Seasonal power trade with India; structured pricing, banking, and ancillary services dialogue.
India	Ambitious targets include 500 GW of non-fossil capacity by 2030, a Green Hydrogen Mission, and advanced EE policies.	Competitive auctions and interstate transmission expansion are well established, though state-level DISCOM finances remain weak.	Grid-scale storage, round-the-clock renewable tenders, deep efficiency in cooling, and e-mobility ecosystems are scaling.	Production-linked incentives for PV and storage; strong monitoring and verification systems; active green bond market.	State regulators need training on storage integration, ancillary services, and reducing DISCOM losses.	Facilitate regional power trade; establish protocols for firm contracts and balancing services.
Maldives	Net-zero by 2030 (conditional) is central to policy; hybridization of island systems is underway.	Still heavily diesel-dependent, renewable penetration is growing in mini-grids; regulatory	Solar-diesel-battery hybrids, rooftop PV, and efficient cooling in the tourism sector are key opportunities.	Aggregated procurement for islands, adoption of O&M standards, and	Utility O&M for hybrid systems, safety standards, and financial	Regional technical exchanges; donor alignment on island

Country	Policy ambition & targets	Market readiness & regulatory maturity	Regional value-add (cooling, storage, DRE)	Technology transfer, monitoring & joint financing	Capacity development priorities	Cooperation needs & high-level engagement
		frameworks are evolving.		concessional joint financing facilities.	structuring for SMEs.	resilience and disaster risk reduction.

Country	Policy ambition & targets	Market readiness & regulatory maturity	Regional value-add (cooling, storage, DRE)	Technology transfer, monitoring & joint financing	Capacity development priorities	Cooperation needs & high-level engagement
Nepal	Hydro-led pathway with a strong export-oriented CBET strategy; diversification into solar and wind is on the agenda.	The hydropower pipeline is clear, non-hydro RE is nascent, and transmission expansion is progressing.	EV electrification with clean power, rooftop solar, and storage for seasonal balancing.	Standardized CBET contracts; donor co-finance for transmission; robust MRV for exports.	Building NEA/AEPC capacity on solar, wind, and storage; training on market operations and forecasting.	Trilateral CBET with India and Bangladesh; cross-border scheduling and settlement dialogues.
Pakistan	ARE policy signals support RE; distributed solar is growing; EE policy is advancing.	Utilities face payment risks and grid stability challenges; net metering reforms are ongoing.	Rooftop solar with storage for reliability, industrial efficiency, and agricultural solar.	Risk-sharing facilities, standardized rooftop contracts, and monitoring for grid safety.	Regulator capacity on DER integration, utility metering, and collections.	Regional technical dialogues; donor alignment on blended finance and reforms.
Sri Lanka	Carbon neutrality by 2050 and 70% RE by 2030 are guiding targets; procurement reforms are underway.	RE share is rising, but grid constraints persist; regulatory modernization is in progress.	Utility-scale wind and solar with storage; efficient cooling; distributed RE for resilience.	Joint financing with guarantees; shared standards for tenders and storage systems.	Training on auction design, tariff frameworks, grid integration, dispatch, and social safeguards.	HVDC interconnection with India; multi-donor coordination for reforms and grid upgrades

Heatmap guide: dark green = strongest; light green = moderate; yellow = limited/emerging; orange = restricted.

- Policy ambition & targets: India is mostly dark green (most progressive). Most others are light green. Pakistan is yellow due to weaker commitments.

- Market readiness & regulatory maturity: Region-wide status is yellow as markets are still evolving. Maldives and Pakistan trail peers due to fossil-fuel dependence and policy frictions.
- Regional value-add: India and Bhutan (green) is the main regional driver. Bhutan and Nepal provide seasonal grid balancing via hydropower. Others are yellow, reflecting modest regional roles to date.
- Technology transfer, monitoring, and joint financing: India leads with technical expertise and supply chains. Bhutan, Nepal, and Sri Lanka are light green as receptive adopters. Pakistan and Maldives are yellow given adoption constraints.

Country-specific recommendations are provided for each country. These include capacity-building priorities, cooperation needs, and high-level engagement.

Table 9: Key Barriers and Enablers for the Clean Energy Transition in South Asian Countries

Country	Barrier 1: Regulatory / market	Barrier 2: Infrastructure/ system	Barrier 3: Finance/ creditworthiness	Enabler 1: Policy & donor signals	Enabler 2: Technology & market momentum	Enabler 3: Cooperation & inclusivity
Bangladesh	Heavy reliance on imported fossil fuels (coal, oil, LNG) exposes Bangladesh to global fuel price volatility and foreign exchange pressures (NDC 3.0, p.21). Renewable energy penetration remains modest (<6% of installed capacity; <9.7% of maximum generation in 2025) despite ambitious targets of 20% by 2030 and 30% by 2040 (NDC 3.0, p.21).	Persistent infrastructure gaps, particularly in waste management, limit scaling of waste-to-energy and integrated sludge management solutions (NDC 3.0, p.33). Grid congestion and high T&D losses (~10%) constrain renewable integration and system flexibility. Limited local manufacturing and maintenance capacity for clean technologies increases costs and	Significant financing gap: conditional mitigation requires USD 9 billion annually, with a USD 8 billion (89%) shortfalls; adaptation faces a USD 4.5 billion (53%) annual gap (NDC 3.0, p.53). High perceived credit risk of green projects deters private sector participation and limits access to affordable capital (NDC 3.0, p.54). Domestic banks remain risk-averse, with limited green lending pipelines.	Recent RE/EE policy updates and active donor programs signal strong support.	Despite challenges, Bangladesh's energy sector shows promise with rapid rooftop PV growth and pilot battery projects, which are creating local proof points.	There is a growing interest in Cross-Border Electricity Trade (CBET) with India/Nepal, and IEPMP has provided a good target for CBET. Several donor pilots explicitly target Micro, Small, and Medium Enterprises (MSMEs) and gender inclusion, paving the way for a more inclusive and cooperative energy sector.

Country	Barrier 1: Regulatory / market	Barrier 2: Infrastructure/ system	Barrier 3: Finance/ creditworthiness	Enabler 1: Policy & donor signals	Enabler 2: Technology & market momentum	Enabler 3: Cooperation & inclusivity
	Policy unpredictability and inconsistent incentives undermine investor confidence in clean energy projects. Bangladesh continues to provide subsidies for coal, LNG, and liquid fuels, which, while aimed at ensuring energy security and affordability to the users and production process, will inadvertently slow the pace of renewable energy deployment and risk locking in fossil infrastructure. These subsidies will also need to be reformed gradually and predictably in line with the principles of transition to prevent a stranded asset situation and rematch the fiscal resources to clean energy and	delays scaling (NDC 3.0, p.58).				

Country	Barrier 1: Regulatory / market	Barrier 2: Infrastructure/ system	Barrier 3: Finance/ creditworthiness	Enabler 1: Policy & donor signals	Enabler 2: Technology & market momentum	Enabler 3: Cooperation & inclusivity
	resilience investments.					
Bhutan	Regulatory frameworks remain focused on hydropower; rules for solar/wind and markets are still being developed.	Limited operational experience outside hydro energy; ancillary services and grid balancing tools are nascent.	Small domestic market size; heavy dependence on concessional and Indian public finance	Stable long-term energy planning and hydro revenues provide fiscal space for pilots.	Emerging solar, wind, and storage pilots complementing hydro; regional trade opportunities growing	India presents opportunities for capacity partnerships on market operations, particularly through its formal seasonal trade.
India	Fragmented state-level regulations and slow progress on distribution company (DISCOM) reforms	Land acquisition and transmission evacuation constraints; need for system products (ancillary services, forecasting)	Stressed DISCOM finances raise perceived counterparty risk despite deep capital markets.	Strong national targets (500 GW non-fossil), production-linked incentives, and active IFI engagement.	Mature auction market; fast uptake of storage, hydrogen pilots, and EV ecosystems	Natural regional hub for standards, procurement templates, and high-level power-trade diplomacy
Maldives	Regulations for distributed energy resources (DER) and island aggregation remain immature.	Small, island grids with limited spare capacity and constrained O&M capability	Minimal fiscal space; most deployment depends on concessional or grant finance	Strong political commitment to net-zero and donor-backed resilience programs.	Proven hybrid mini-grid models and the tourism sector's interest in efficiency measures	Ready audience for regional technical exchange on island resilience and disaster risk reduction
Nepal	Lengthy permitting for non-hydro renewables; CBET rules still being operationalized	Transmission bottlenecks and seasonal variability reduce full value capture from hydro and solar.	Private financing focused on hydro; non-hydro projects struggle to attract commercial capital	Clear export strategy and sustained IFI interest for transmission projects	Growing rooftop and EV pilots; early green hydrogen policy signals	Trilateral CBET opportunities (India/Bangladesh) require policy harmonization and settlement mechanisms
Pakistan	Inconsistent policy signals and incomplete rules for DER integration	Frequent grid instability, weak metering, and high	Large circular debt and payment delays undermine the bankability of generation and	National ARE/EE policies and early blended-finance	Rapid growth in rooftop solar and industrial EE interest provides	Scope for donor-facilitated technical dialogues and targeted

Country	Barrier 1: Regulatory / market	Barrier 2: Infrastructure/ system	Barrier 3: Finance/ creditworthiness	Enabler 1: Policy & donor signals	Enabler 2: Technology & market momentum	Enabler 3: Cooperation & inclusivity
		technical/non-technical losses	distribution investments	facilities offer a foundation	scalable opportunities	inclusion programs for vulnerable users
Sri Lanka	Recent policy uncertainty and constrained regulatory capacity have slowed reform implementation.	Distribution networks need upgrades to absorb growing RE shares and dispatch storage.	Acute fiscal stress; reliance on guarantees and IFI risk instruments to attract investors	Carbon-neutral roadmap and IFI engagement create an enabling policy frame	Emerging wind/solar pipelines and DRE pilots for resilience	HVDC interconnection planning with India and a strong appetite for coordinated donor support

Regional Trend 2: Distributed Renewables, Storage and Efficiency for Resilience

India, Bangladesh, the Maldives, Pakistan, and Sri Lanka increasingly deploy rooftop solar, hybrid mini-grids, and battery storage as distributed energy resources (DERs). These solutions have become central to strengthening reliability, reducing fossil fuel dependence, and enhancing resilience in disaster-prone and remote areas. Backed by more efficient use of energy, support for such localised technology interventions can improve local energy security and livelihoods

Opportunity: Rooftop solar storage can supply stable power to households, SMEs, and essential services in times of disaster. Hybrid mini grids can decrease reliance on diesel in remote locations and islands. Standardized contracts and aggregated procurement can create scale for efficient equipment and save costs.

Proposed Recommendations for the Collaborative Platform:

- Develop regional technical standards and best practices for rooftop PV and battery systems, including safety, interconnection, and dispatch protocols, to ensure efficiency and accelerate deployment, while ensuring the minimum disturbance to the grid stability
- Facilitate aggregated energy efficiency, incentives and PV procurement across utilities, municipalities, and island systems to achieve economies of scale.
- Embed DER into disaster risk reduction planning, for example, cyclone-ready mini-grids and storage for hospitals and schools.
- Establish blended finance facilities targeting MSMEs and community institutions, ensuring inclusivity and resilience.

Regional Trend 3: Nature-Based Energy Solutions and Disaster Resilience

Nature-based solutions (NbS) remain underutilized in energy planning. Bhutan and Nepal link watershed protection to hydropower reliability, while Bangladesh and Sri Lanka experiment with coastal mangroves and wetlands. Urban cooling, green infrastructure, and ecosystem MRV remain nascent.

Opportunity: NbS can lower risks to energy infrastructure, strengthen grid resilience, and deliver co-benefits such as biodiversity protection and improved community livelihoods.

Proposed Recommendations for the Collaborative Platform:

- Fund the NbS integrated energy MRV frameworks, which measure resilience and co-benefits in a manner that would appeal to climate / blended finance.
- Encourage the extent of urban cooling and green infrastructure as national EE approaches with national level incentives to local authorities and technology providers.
- NbS pilots may be aligned with renewable deployment zones to maximize donor co-benefits and interest.
- Engage corporates to participate in greening, cooling, nature based DRR leading to business continuity and resilient infrastructure through green bonds and ESG efforts.

Regional Trend 4: Support for Just Transition and Climate Prosperity

The South Asian area is one of the most susceptible climatic areas globally. Rising temperatures, irregular rainfall, flash floods, and cyclonic surges, particularly in the southern subregion, threaten both energy supply and demand. Bangladesh and the Maldives have already adopted Climate Prosperity Plans along with Sri Lanka publishing a plan. These plans link clean energy with employment, equity, and resilience. At the same time, climate prosperity investments could help in debt resilience in several South Asian countries.

Opportunity: By embedding climate prosperity and climate justice principles, the energy transition can attract climate-aligned capital, reduce risk premiums, and ensure benefits to vulnerable groups, while encouraging investment in energy transition as part of loss and damage process

Proposed Recommendations for the Collaborative Platform:

- Incorporate climate prosperity framing into regional energy discourse, positioning clean energy as a driver of growth and stability aligned with climate and development objectives as defined by international agreements.
- Embed transition toolkits—such as safeguards, skilling, and MSME inclusion—into renewable energy and energy efficiency programs.
- Showcase resilient renewable energy models (e.g., cyclone-ready mini-grids, hydro-solar balancing) through regional platforms to attract investment.
- Design inclusive finance mechanisms that prioritize women, MSMEs, and vulnerable communities.
- Prepare countries to meet the EU led series of conditions for exports such as EUDR under Green Challenge.

3 Stakeholder Landscape

3.1 Stakeholder Mapping Framework and Approach

The stakeholder mapping exercise shown below is developed based on systematic desk-based research and goes beyond static “power–interest” grids, emphasizing a multi-dimensional view that considers influence, institutional mandate, level of interest, and potential alignment with clean energy transition objectives. This adaptability ensures its relevance in the ever-changing energy sector and its linkages with food security, employment, low carbon growth, urban service delivery, transport system, export and investment potential and ecosystems and ecosystem services As such, the energy sector efficiency and resilience provides the key for sustainability of countries in the region.

In South Asia, the institutional stakeholder landscape is particularly complex. It spans central ministries of energy, finance, and environment; regulatory commissions; state-owned utilities; private developers and financiers; multilateral and bilateral partners; and civil society actors. Recognizing this diversity, the mapping distinguishes between policy-setting institutions, implementing agencies, regulators, and market participants, ensuring clarity on where authority lies and collaboration is most feasible.

The exercise also acknowledges that the political and economic environment in the region is fluid. Stakeholder relevance may change rapidly with policy changes, donor programmes, or market changes. We therefore treat this mapping as a dynamic, living system that requires regular updates rather than a fixed tool. We also embedded inclusivity, since energy transition outcomes affect communities differently. The mapping reflects the perspectives of women, vulnerable groups, and local communities alongside institutional actors.

The following Tables 10-16 provide a concise overview of each country's most influential and interested stakeholders. They are not exhaustive, but they establish a structured foundation for UNOPS to identify priority counterparts, avoid duplication of work, and target engagement where it can have the most effective catalytic effect. In compiling this detail, emphasis is placed on those stakeholders that will have the most likely initial engagements with UNOPS on the design of the Collaborative Platform modality. There are many other individual stakeholder organizations across government (national and local), semi-government agencies and state-owned enterprises, donors/development partners, industry associations and chambers of commerce, corporates, international agencies, academia and research, and civil society organizations that would need to be engaged related to the program designs as well as in the implementation phases.

Based on stakeholders' consultation feedback, the mapping should explicitly recognize social protection and labour-market institutions (e.g., labour ministries, TVET bodies, social welfare agencies) as relevant actors for just transition delivery.

It should be noted that the energy transition described in this report also include extended areas such as greening, NbS, DRR etc., Each country has key stakeholder entities including Ministries for Environment, Industries, Water Management and others that were not summarized in the following tables highlighting the key direct energy sector stakeholders. The programme could expand the stakeholder network depending on the country's priorities on NbS, DRR and Climate Impacts.

Table 10: Key Stakeholder Mapping - Bangladesh

Type of Institution	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
Government	Power Division, Ministry of Power, Energy and Mineral Resources MoPEMR (https://powerdivision.gov.bd)	Power policy, planning, procurement oversight, grid expansion	High	High	Integrated Energy and Power Master Plan; utility-scale solar program	Sets the overall direction of the power and energy sector. For the Platform, this ministry is relevant as it defines the national priorities that any regional cooperation or financing alignment would need to respect.
Agency	SREDA (https://www.sreda.gov.bd)	RE/EE policies and standards; net metering; EE labeling	Medium	High	Net metering guide Lines; EE&C Master Plan	Leads renewable energy and efficiency initiatives. Its relevance lies in showing how Bangladesh is structuring its clean energy transition, which helps the Platform identify where regional tools or knowledge could complement national efforts.
Regulator	BERC (http://www.berc.org.bd)	Tariffs, licenses, wheeling/banking rules	Medium-High	Medium	Tariff reforms; distributed generation regulations	Oversees tariffs and regulatory frameworks. For the Platform, BERC illustrates how regulatory clarity and enforcement shape investment conditions and where regional standardization could add value.
Utility	BPDB (https://www.bpdb.gov.bd)	Generation offtake; PPAs; grid integration	High	Medium	Solar tenders; grid upgrades	Transaction structuring and grid readiness pilots; It is important to align donor TA/finance with BPDB priorities
Financier	Bangladesh Investment Development Authority (BIDA) https://www.investbangladesh.gov.bd/ IDCOL (https://idcol.org)	Concessional debt for rooftop/mini-grids; pipeline development	Medium	High	Rooftop solar and mini-grid financing lines	Demonstrates how domestic financial institutions can channel concessional and blended finance. The Platform can learn from IDCOL's model when considering how to strengthen local green finance ecosystems across the region.
Donor/IFI	ADB (https://www.adb.org)	Sovereign and non-sovereign RE/EE finance	High	High	Grid modernization; solar IPPs	Co-finance platforming and results tracking with the Platform to avoid overlap and accelerate disbursement.
Private	Beximco/United/BSREA developer cluster	IPP pipeline; C&I solar/wind	Medium	High	Utility-scale and C&I projects	It is important to surface bankability constraints and standardize documentation across projects
Civil society and research	Bangladesh Energy and Power Research Council (BEPRC),	Policy and technical research on RE/EE, urban cooling, and grid integration;	Medium	High	Rooftop solar and energy audit studies; urban heat/cooling	These actors provide independent evidence and community perspectives that shape policy acceptance and program design. For the

Type of Institution	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
	BUET, Centre for Policy Dialogue (CPD), Tetra Tech (https://www.tetratech.com/) Bangladesh Sustainable and Renewable Energy Association (BSREA) https://bsreabd.org/ , Bangladesh Environmental Lawyers Association (BELA)	community engagement and safeguards; legal advocacy on environmental compliance			pilots; policy briefs on net metering, tariffs, and NbS; community awareness programs	Platform's scoping, they indicate where inclusivity, safeguards, and locally grounded knowledge can strengthen future regional support without duplicating government or donor roles.

Table 11: Key Stakeholder Mapping - Bhutan

Type of Institution	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
Government	Ministry of Energy and Natural Resources MoENR (https://www.moenr.gov.bt)	Energy policy, planning, approvals	High	High	National Energy Policy 2025; diversification beyond hydro	Defines Bhutan's long-term energy strategy. Relevant to the Platform as it shows how a hydro-centric system is beginning to diversify and how this could connect with regional balancing.
Regulator	Electricity Regulatory Authority,ERA (https://www.era.gov.bt)	Tariffs, licenses, grid codes	Medium	High	Grid code modernization; open access	Provides oversight of tariffs and licensing. For the Platform, ERA's role shows how regulatory institutions can evolve to accommodate new renewable technologies.
Utility (Gen)	Druk Green Power Corporation DGPC (https://www.drukgreen.bt)	Hydropower generation expansion	High	Medium	Reservoir hydro; pumped storage siting	Operates most hydropower assets. Its role illustrates the importance of large utilities in shaping export potential, which is central to regional trade discussions.
Utility (T&D)	Bhutan Power Corporation — BPC (https://www.bpc.bt)	Transmission/distribution; interconnections	High	Medium	Grid reinforcement; digitalization	Manages transmission and distribution. Relevant to the Platform as it highlights the operational side of integrating new technologies and ensuring system resilience.
Donor/IFI	World Bank (https://www.worldbank.org)	Climate/disaster risk and resilience financing	Medium	High	CCDR actions; infrastructure resilience	It could be important to blend resilience metrics into energy investments and coordinate pipeline
Donor/IFI	ADB (https://www.adb.org)	Energy diversification TA and finance	Medium	High	RE pilots; sector assessments	The Platform may attempt to structure co-financed pilots and knowledge exchange with region
Private	Bhutan Ventures Energy Ltd., Druk Hydro Energy Ltd., DGPC, and BPC as state-linked corporates in PPPs.	Solar/wind pilots; BESS	Low–Medium	High	Early-stage projects	The Platform can support standardizing contracts and de-risk pilot scale-ups
Civil society and research	Royal University of Bhutan (College of Science and Technology), Tarayana Foundation, Bhutan Ecological Society	Applied research on grid integration, storage, and building efficiency; watershed/ catchment NbS linked to hydropower reliability; community	Medium	High	EE building guidelines; NbS pilots in hydro catchments; awareness campaigns on rooftop solar /EE	They surface the environmental and social dimensions of Bhutan's hydro-centric transition and early diversification. For the Platform, they can help frame regional NbS based energy MRV, safeguards, and community benefit approaches could complement national strategies.

	engagement and livelihood co-benefits

Table 12: Key Stakeholder Mapping – India

Type of Ins.	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
Government	MNRE (https://mnre.gov.in)	RE policy, incentives, PLI/manufacturing	High	High	500 GW non-fossil by 2030; PLI for PV/storage	Leads renewable energy expansion. Relevant as a source of lessons on scaling RE that could inform regional cooperation.
Government	CERC Central Electricity Regulatory Commission www.cercind.gov.in	Regulatory and tariff controls, agreement conditions	High	High	Creating an enabling environment fostering a competitive and investment-friendly environment.	Regulating electricity generation, inter-state transmission, and tariffs to ensure efficiency, competition, and investment in the power sector
Government	Ministry of Power / Central Electricity Authority,CEA (https://cea.nic.in)	System planning; National Electricity Plan; grid codes	High	High	Transmission expansion; integration standards	The Platform can facilitate regional knowledge transfer on grid integration and flexibility
Agency	Bureau of Energy Efficiency, BEE (https://beeindia.gov.in)	EE standards and market instruments	Medium	High	RCO mandates; cooling plan	Drives efficiency programs. Relevant as it shows how efficiency and cooling strategies can be integrated into transition planning.
Implementer	SECI (https://www.seci.co.in)	RE auctions; hybrid/RTC; hydrogen	High	High	RTC tenders; GH2 pilots	Designs and implements auctions. Relevant as it provides tested procurement models that could be adapted regionally.
Utility	POWERGRID (https://www.powergrid.in)	ISTS buildout; green corridors	High	Medium	GEC; system strengthening	The Platform can consider them as a hub of regional transmission planning dialogue and CBET readiness
Donor/IFI	IFC/World Bank/AIIB (https://www.ifc.org)	Private capital mobilization, guarantees	Medium–High	High	RE/storage/green bonds	The Platform to align risk instruments for replication in smaller markets
Private	NTPC/RE arm; ReNew/Adani/Tata Power	Utility-scale RE, storage, GH2	High	High	RTC/storage procurement	The Platform can channel private-sector insights on cost, contracts, and O&M to regional peers
Civil society and research	TERI, CEEW, WRI India, Shakti Sustainable Energy Foundation	Policy design and market analysis for RE auctions, storage, hydrogen, and cooling; urban planning and transport	High	High	Auction and tariff design studies; hydrogen roadmaps; thermal comfort	Their work informs national and state practice and offers models relevant to neighboring countries. For the Platform's future role, these institutions indicate where regional standardization

	electrification; social safeguards and just transition frameworks	and cooling programs; industrial EE toolkits	and knowledge transfer could be grounded in proven Indian experience, while remaining sensitive to local contexts elsewhere.

Table 13: Key Stakeholder Mapping - Maldives

Type of Ins.	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
Government	Ministry of Climate Change, Environment & Energy (https://www.environment.gov.mv)	Policy, targets, regulatory oversight	High	High	Energy Policy & Strategy 2024–2029; JET Roadmap	Provides policy direction for island systems. Relevant as it illustrates how small island states frame resilience and net-zero ambitions.
Utility	STELCO (https://www.stelco.com.mv)	Urban/island generation and distribution	High	High	Solar-BESS hybrids; grid upgrades	Operates the main utility in Malé. Relevant as it shows operational realities of hybrid mini-grids and distributed systems.
Utility	FENAKA (https://fenaka.com.mv)	Power for outer islands; mini-grids	High	High	Solar-diesel-BESS systems	Runs island-level systems. Relevant as it highlights the challenges of scaling renewables in dispersed geographies. d
Finance	Ministry of Finance (https://www.finance.gov.mv)	Fiscal policy; guarantees; PPP	High	Medium	Budget support; concessional finance	The Platform can structure blended finance and payment security for SMEs/IPP
Donor/IFI	ADB (https://www.adb.org)	RE/WtE investments and TA	Medium	High	Hybrid plants; grid modernization	Already active in financing resilience and RE. Relevant as they illustrate the donor landscape that regional initiatives must complement.
UNDP	UNDP/UNCDF (https://www.undp.org/maldives)	SME finance, risk participation	Medium	High	RE loan guarantee pilots	The Platform can scale gender-responsive MSME finance for rooftop/efficiency
EPC / Developer	Renewable Energy Maldives Pvt. Ltd. (REM)	Local EPC and project developer for solar PV and hybrid systems	Medium – technical implementer, local expertise	High – business growth in solar and storage	Installed solar PV in islands, schools, and resorts	Key technical partner for scaling distributed renewables
Civil society and research	Maldives National University, Blue Prosperity Coalition (local partners), IUCN Maldives collaborators	Island resilience research; community engagement for rooftop and hybrid mini-grids; coastal NbS and disaster preparedness linked	Medium	High	Community readiness and safety training for solar-BESS; coastal NbS pilots; local surveys on energy access and affordability	They reflect island realities like limited land, high disaster exposure, and the importance of inclusive planning. For the Platform, they point to where resilience, DER standards, and community benefit frameworks

Type of Ins.	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
		to energy infrastructure				may be most impactful if pursued through regional guidance rather than direct delivery.

Table 14: Key Stakeholder Mapping - Nepal

Type of Ins.	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
Government	Ministry of Energy, Water Resources and Irrigation MoEWRI (https://www.moewri.gov.np)	Energy policy/planning; CBET policy	High	High	Energy Development Roadmap; CBET MoUs	Defines national energy strategy. Relevant as it shows how domestic priorities connect with regional trade ambitions.
Utility	Nepal Electricity Authority NEA (https://www.nea.org.np)	Generation, T&D; PPAs; exports	High	High	Power exports to India/Bangladesh; grid upgrades	Utility and system operator. Relevant as it highlights the operational side of hydro exports and integration of new technologies.
Agency	Alternative Energy Promotion Centre ,AEPC (https://www.aepc.gov.np)	DRE, clean cooking, MSME support	Medium	High	NREP/SECF; rooftop PV; e-cooking	Leads distributed RE and clean cooking. Relevant as it demonstrates how smaller-scale renewables are promoted alongside large hydro.
Private/Assoc.	IPPAN (https://www.ippan.org.np)	IPP pipeline; advocacy for CBET	Medium	High	Hydro export agenda	Represents private developers. Relevant as it shows how private sector perspectives shape investment climates.
Donor/IFI	World Bank/IFC/ADB (https://www.worldbank.org)	Transmission finance; guarantees	Medium–High	High	Transmission and market reforms	The Platform to coordinate transaction pipelines and de-risking instruments
Regional	CERC/Indian buyers; BPDB	Offtake for CBET	High (external)	High	Cross-border PPAs	The Platform to convene trilateral dialogues and standardize contracts
Private Utilities / IPPs / EPCs	Independent Power Producers' Association of Nepal (IPPAN); Butwal Power Company (BPC); Sanima Hydropower Ltd.; Nepal Hydro Developers Ltd.	Mobilize private hydropower developers; develop and operate medium/large hydro projects; increasingly explore solar and hybrid projects	High private sector generates >80% of Nepal's electricity (≈2,900 MW of	Very high – strong commercial interest in hydropower,	IPPAN's "Mission 28,500 MW by 2035" campaign; BPC's crossborder power trade projects; Sanima's portfolio of runofriver hydropower;	Critical anchor for the Platform: demonstrates private sector leadership in generation, mobilizes billions in investment, and is central to regional power trade and renewable diversification

Type of Ins.	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
			3,600 MW installed capacity)	solar, and exportin g power regionall y	private sector participation in ADB/World Bank solar pilots	

Table 15: Key Stakeholder Mapping - Pakistan

Type of Ins.	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
Government	Ministry of Energy Power Division (https://www.mowp.gov.pk)	Power policy; IGCEP; RE frameworks	High	High	ARE Policy; net metering reforms	Sets national energy policy. Relevant as it defines the framework within which renewable and efficiency measures are pursued.
Regulator	NEPRA (https://www.nepra.org.pk)	Tariffs; grid codes; net metering	High	High	Distributed solar regulation	Oversees tariffs and DER rules. Relevant as it illustrates how regulatory clarity affects investment confidence.
Agency	Alternative Energy (within MoE)	RE facilitation; IPP interface	Medium	High	Wind/solar procurement	The Platform can support to standardize documentation and de-risking for IPPs
Utility	NTDC/Discos (https://www.ntdc.com.pk)	Transmission planning; dispatch	High	Medium	Grid upgrades; digitalization	Reflect the financial and operational challenges of the sector. Relevant as they show where systemic weaknesses affect transition progress.
Donor/IFI	ADB/GCF/World Bank (https://www.adb.org)	Blended finance; guarantees	Medium–High	High	Rooftop/C&I solar; storage pilots	The Platform can coordinate risk instruments and local bank capacity
Think tank	SDPI (https://sdpi.org)	Policy analysis; convening	Medium	Medium	Energy transition briefs	The Platform may help to channel evidence into reform dialogues and public acceptance
Private / Assoc.	Pakistan Alternative Energy Association (PAEA); Renewable Energy Association of Pakistan (REAP); Pakistan Solar Association (PSA)	Represent developers and EPCs in solar, wind, and hybrid projects; advocate for policy reforms; provide market feedback on auctions and tariffs	Medium recognized interlocutors with AEDB, NEPRA, and MoE	High – strong commercial interest in scaling utilityscale RE and distributed solar	Pipeline of utilityscale solar and wind projects; engagement in upcoming competitive auctions; advocacy for netmetering and bankable PPAs	The Platform can leverage these associations to integrate private sector perspectives, improve auction design, and enhance bankability of RE projects
Civil society and research	SDPI, LUMS Energy Institute, LEAD Pakistan, Alternative Energy Development advocacy groups	Policy analysis on DER integration, net metering, and EE; industrial decarbonization pathways; urban cooling and disaster resilience; inclusion and affordability	Medium	High	Rooftop and C&I solar studies; EE and metering pilots; just transition and inclusion briefs; stakeholder dialogues	They bring evidence on regulatory consistency, affordability, and inclusion—core issues for investment confidence. For the Platform, they indicate where regional standardization and finance coordination could support national efforts without duplicating existing TA.

Table 16: Key Stakeholder Mapping - Sri Lanka

Type of Ins.	Organization	Key roles in clean energy transition	Influence	Interest	Key initiatives	Relevance to the Collaborative Platform
Government	Ministry of Power & Energy (https://powermin.gov.lk)	Energy transition policy; private participation law	High	High	CNZ 2050 Roadmap; energy transition legislation	Sets national RE targets. Relevant as it defines the strategic direction that regional cooperation would need to align with.
Utility	Ceylon Electricity Board ,CEB (https://ceb.lk)	Generation, T&D; RE procurement	High	High	RE tenders; grid expansion	Main utility. Relevant as it illustrates the operational and financial realities of integrating higher shares of renewables.
Regulator	PUCSL (https://www.pucsl.gov.lk)	Tariffs; market rules; licenses	High	Medium	Regulatory modernization	Regulates tariffs and procurement. Relevant as it shows how regulatory oversight shapes investment conditions.
Donor/IFI	World Bank/IFC (https://www.worldbank.org)	Guarantees; mobilization; private RE	High	High	1 GW RE program; risk instruments	Already active in financing. Relevant as they represent the donor landscape that regional initiatives must complement.
Donor/IFI	ADB (https://www.adb.org/projects/56246-001)	Private investment enabling TA	Medium	High	Enabling environment for private RE	The Platform to ensure non-duplication and shared M&E
Private / Assoc.	Sri Lanka Solar Industries Association (SLSIA); Vidullanka PLC; Greenpower SL	Represent solar developers and EPCs; develop small hydro, solar, and rooftop projects; mobilize private capital for renewables	Medium recognized by CEB and Sustainable Energy Authority, but policy space still dominated by government	High strong commercial interest in scaling solar, wind, and small hydro	Vidullanka's portfolio of small hydro and solar; Greenpower SL's rooftop solar expansion (80MWp, scaling to 190MWp with PIDG/Norfund support); SLSIA advocacy on	The Platform can leverage these associations and firms to integrate private sector perspectives, improve auction design, and mobilize blended finance for bankable RE projects

					tariffs and netmetering	
Civil society and research	SLYCAN Trust, University of Moratuwa, Sri Lanka Energy Managers Association (SLEMA), IWMI (Colombo)	Research and capacity building on RE integration, storage, and efficiency; wetlands/coastal NbS; social safeguards and community benefits under fiscal constraints	Medium	High	EE and rooftop programs; wetlands and NbS pilots linked to resilience; public dialogues on procurement and tariffs	They help ensure that reform and procurement agendas remain socially grounded and resilient. For the Platform's scoping, they signal where inclusive frameworks, NbS–energy MRV, and standardized approaches could add value alongside donor-led investments.

4 Regional Stakeholder Landscape

It is also essential to understand the regional stakeholder environment in South Asia related to energy transition, which remains crowded and fragmented with numerous development banks, bilateral donors, UN agencies, and intergovernmental platforms. Mapping these actors is vital to know who provides support and how their interventions are consistent or, in some cases, overlapping between countries.

Stakeholders' consultations also expressed that readiness of just transition is not merely a case of energy-sector agenda. Labour, social welfare and institutions of skills-development can shape the measures or feasibility of transition pathways via social protection, reskilling and social acceptance.

At the regional level, multilateral development banks such as the Asian Development Bank and the World Bank Group remain the most influential financiers, shaping policy reforms and underwriting large-scale investments. Bilateral programs are specialized in policy and regulatory assistance, like the (now discontinued) USAID South Asia Regional Energy Partnership (SAREP) and the multi-year program technical assistance of GIZ in South Asian countries. Although SAREP is now defunct, we have still kept it in the list to show its scope of committed incomplete works that now present opportunities for other donors and development partners to intervene. It is expected that UNDP and UNCDF introduce non-discriminatory capacity-building strategies that can be added to infrastructure investments. Regional cooperation is also provided through formal mechanisms and intergovernmental platforms such as SAARC and BIMSTEC.

In pursuing the Collaborative Platform, UNOPS and SEforALL has a number of global stakeholders to consider as well: these include organizations and instructions that oversee a number of important frameworks and mechanisms, such as

- Overarching programs of Sustainable Energy for All
- Paris Agreement Article 6 and loss and damage funding
- Convention of Biodiversity (CBD) through Global Biodiversity Framework (GBF)
- Sendai Framework for Disaster Risk Reduction (SFDRR)
- EU Green Deal elements that promote renewable energy, among others

Design of recommendations and actions must necessarily be situated within these Frameworks and take into consideration the prescriptions and required actions of the programs they promote globally.

For the Collaborative Platform modality, this mapping highlights where the most significant opportunities lie in convening these diverse actors, reducing duplication, and filling systemic gaps in regulation, finance, and inclusivity. Playing the role of a coordinating platform, the Platform can contribute to the assurance of transferring regional efforts to country-level outcomes and give some sense of reassurance and confidence in South Asia's clean energy transition process.

Table 17: Regional Stakeholder Mapping – South Asia Energy Transition

Type of Institution	Organization	Thematic relevance	Supports rendered	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
Multilateral Development Bank	**Asian Development Bank (ADB)**	Renewable energy, grid modernization, private sector participation	Concessional loans, grants, TA, blended finance	Utility-scale solar, grid upgrades, TA on EE	Hydro diversification, grid reinforcement	Green corridors, RE auctions, storage pilots	Hybrid RE-diesel systems, WtE	Transmission finance, DRE pilots	Solar/wind IPPs, distribution reforms	Private RE investment enabling, grid upgrades
Multilateral Development Bank	**World Bank Group (IBRD/IFC/MIGA)**	Policy reforms, guarantees, risk mitigation, RE/EE finance	Sovereign loans, guarantees, TA, private capital mobilization	Guarantees for rooftop solar, TA on policy	CCDR, resilience finance, hydro diversification	Risk mitigation for RE, IFC green bonds	Guarantees for hybrid RE, TA on resilience	Transmission and CBET finance, IFC SME RE	Guarantees for IPPs, TA on EE	Risk mitigation for RE auctions, IFC PPP support
UN Agency	**UNDP / UNCDF**	Capacity building, inclusive finance, NDC support	TA, grants, risk participation schemes	Gender-responsive MSME finance pilots	NDC 3.0 readiness, capacity building	EE programs, state-level pilots	SME RE finance, risk sharing	SECF, DRE finance	EE and RE TA, policy support	Just transition, EE TA
Regional Inter-governmental	**SAARC Energy Centre (SEC)**	Regional cooperation, knowledge sharing, CBET	Policy dialogues, studies, training	CBET studies, RE policy exchange	Hydro trade facilitation	Regional grid studies	Knowledge sharing	CBET facilitation	Policy dialogues	Regional integration
Regional Intergovernmental	**BIMSTEC Energy Centre**	Power trade, regional grid integration	Policy coordination, technical studies	CBET frameworks	Hydro export facilitation	Regional trade protocols	Not applicable	CBET facilitation	Regional trade dialogue	India–Sri Lanka interconnection
Bilateral Donor	**USAID (SAREP / South Asia Regional Energy Partnership)**	RE integration, market reforms, CBET	TA, policy support, capacity building	Net metering, RE auctions	Grid codes, RE pilots	Market reforms, RE tenders	RE integration pilots	CBET facilitation, RE policy	RE auctions, EE	RE auctions, grid integration
Bilateral Donor	**GIZ (Germany)**	RE/EE, distributed RE, policy reforms	TA, grants, policy advisory	Rooftop solar, EE	EE pilots, RE diversification	EE programs, RE pilots	RE hybrids	EE, RE pilots	RE integration, EE	EE, RE pilots
Think Tank / Technical Agency	**International Energy Agency (IEA)**	Investment analysis, policy benchmarking	Knowledge products, policy advice	Investment outlooks	Policy benchmarking	World Energy Outlook, India case	Policy advice	Investment diagnostics	Policy advice	Policy advice
Climate Finance	**Green Climate Fund (GCF)**	Climate finance, de-risking	Grants, concessional loans, guarantees	Solar rooftop, resilience	Hydro resilience	RE/storage	Hybrid RE	DRE, resilience	RE/EE	RE/storage

5 Conclusions

The regional analysis through this scoping shows that South Asia's energy transition is defined less by a lack of ambition than by uneven readiness, financing deficit and persistent structural barriers, complicated by climate change and barriers to low-carbon economic growth. Every country in the region has articulated medium to long-term clean energy targets, and several countries like India, Nepal, Bhutan, and the Maldives have gone further by embedding net-zero or carbon neutrality commitments into national strategies. Yet the ability to translate these ambitions into bankable projects and resilient systems remains constrained by several interlinked challenges, including: regulatory clarity, system flexibility, lack of regional synergy, and capital affordability. Most countries are involved in exports to the EU and upcoming regulations by EU require elements of Energy Transition implemented sooner.

Across the region, regulatory frameworks are still catching up with the pace of technological change to take advantage of climate prosperity and climate justice. Climate resilient energy infrastructure requires high investments as most current infrastructure will not stand extreme conditions. Energy transition may provide an opportunity to invest in resilient infrastructure. In that context, new programmes such as blended financing, investments tied up to loss and damage funds can play an innovative role in combination with conservation objectives via Payments for Ecosystem Services (PES).

Rules for distributed energy resources, storage integration, and cross-border electricity trade remain fragmented or underdeveloped, raising transaction costs and deterring private investment. Stakeholders' consultations also underscored that demand-side measures, particularly energy efficiency, cooling, and building performance, represent some of the most immediate and cost-effective transition levers yet remain under-prioritized in regulatory and financing frameworks.

Grid infrastructure is another binding constraint: congestion, limited forecasting and ancillary services, and fragile island systems restrict the ability to absorb variable renewables. Financial fragility compounds these issues. Distribution company losses in India, circular debt in Pakistan, and fiscal stress in Sri Lanka undermine investor confidence. Smaller markets such as Bhutan and the Maldives remain heavily dependent on concessional finance.

At the same time, the analysis identifies a strong potential for regional cooperation. The level of political ambition is high, and donor pipelines are operating in all seven countries. Rooftop solar, battery pilots, and industrial efficiency are already proving the concept. Nepal and Bhutan are hydropower resources, providing a natural anchor for regional balancing. Also, there is an increasing awareness of the necessity to incorporate inclusivity and resilience into energy planning. Bangladesh and Sri Lanka are beginning to integrate gender and MSME participation. Bhutan and Nepal are linking watershed protection to hydropower reliability, and the Maldives has pioneered hybrid mini-grids that combine renewable generation with disaster readiness. These examples show that the region is not starting from scratch but requires coordination, standardization, and scaling to move from pilots to systemic change. Overall, integrated planning of the energy transition to include multiple sectors and multiple stakeholders and expand to the regional context may provide a timely option to enhance the synergy and momentum of the low-carbon transition, where energy would be a pivotal sector.

For the South Asia energy transition initiative, the implications are clear. The partnership approach should not replicate the technical assistance already provided by others, nor should it attempt to compete with the sovereign lending of development finance institutions. Its comparative advantage lies in acting as a standard-setter and convener: publishing contract templates, technical codes, and safeguard frameworks that can be adopted across borders; aligning donor finance windows to reduce duplication and lower the cost of capital; and aggregating demand for distributed solutions so that rooftop solar, storage, and hybrid mini-grids can achieve economies of scale.

This role is particularly relevant for supporting regulators and aligning regional tools with national MRV systems, helping reduce transaction costs while strengthening transparency, credibility, and investor confidence. The role of Collaborative Platform in the transition to entrench climate prosperity and climate justice is equally important. The partnership can make the transition technically plausible, socially inclusive, and politically sustainable by connecting clean energy to employment, MSME finance, and sharing community benefits. Strengthening skills development and TVET systems will be essential to ensure that workforce readiness keeps pace with policy ambition, particularly for distributed renewables, storage, energy auditing, and efficient cooling.

Country-specific engagements can be used to strengthen regional priorities, such as Bangladesh, which requires stable wheeling and tariff regulations, enhanced bank involvement, and rooftop and storage implementation assistance. Bhutan needs to diversify beyond hydropower and develop regulatory capacity for new technologies. India must pursue deeper state-level reforms, integrate storage, and share procurement experience with its neighbors. The Maldives requires aggregated procurement and O&M standards for island hybrids, while Nepal must streamline permitting for non-hydro renewables and operationalize cross-border trade agreements. Pakistan needs to stabilize policy signals, address payment security, and upgrade metering and collections. Sri Lanka needs to modernize procurement, strengthen grid dispatch, and advance its planned HVDC interconnection with India while exploring green hydrogen-based pathways. .

The investment climate for a just energy transition is uneven but evolving. No South Asian country has yet secured a formal Just Energy Transition Partnership. Still, elements of just transition are emerging through safeguards, skilling programs, and MSME finance embedded in donor pipelines. India is leading on green hydrogen, with Bhutan exploring hydro-powered electrolyzers and others at the scoping stage. The most immediate regional opportunity is still cross-border trade, whereby Nepal and Bhutan can be seen to be able to export surplus hydro to India and Bangladesh, and Sri Lanka to consider interconnection with India. The key bottleneck is financing: although India enjoys rich domestic markets, most other nations depend on concessional flows. In this case, the Collaborative Platform has the opportunity to contribute value through organizing blended finance, creating joint guarantees and payment security systems, and enhancing the capacity of local banks to evaluate green projects.

Lastly, this study highlights the significance of incorporating nature-based solutions and disaster risk reduction in the energy transition. In Bangladesh, NbS has already been shown to be used to reduce infrastructure risk and increase resilience through mangrove restoration, wetland protection, and watershed management in Bhutan and Nepal. Embedding these approaches into renewable energy planning, supported by robust MRV frameworks, can unlock new streams of climate finance while delivering co-benefits for biodiversity and livelihoods. In parallel, disaster-ready energy systems, cyclone-resilient mini-grids, storage for critical services, and urban cooling measures will be essential to

protect investments in a region that is among the most climate-vulnerable in the world. This highlights these actions' urgency and potential impact on the energy transition.

These findings highlight Collaborative Platform's definite objective: to fill the gap between ambition and implementation. The collaboration will enable the region to hasten the Just Energy Transition, generate jobs, and promote a vision of climate prosperity and justice that will result in cleaner, more resilient, fairer, and investable energy systems in the region by standardizing tools, coordinating finance, and incorporating inclusivity and resilience.

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