



Government of Nepal
Ministry of Energy, Water Resources and Irrigation
Alternative Energy Promotion Centre



Progress at a Glance: Year in Review
FY 2081/82 (2024/25)

Description of Photographs Used in report (in the order they appear in front of each chapter)

Alternative Energy Promotion Centre Office, Tahachal, Kathmandu (Cover Page)

Inauguration of Electric Vehicle Charging Station by Hon. Minister Kul Man Ghising

National Forum on Carbon Financing Opportunities in Energy Project 2025

Energy Transition for Resilient and Low Carbon Economy Summit 2025

Solar Irrigation Pump at Susta Rural Municipality, Nawalparasi

28th AEPC Day Celebration

Solar Minigrid Project (120 kWp) installed at Soru Rural Municipality-3, Mugu

AEPC and GCF officials meet in Kathmandu to review the implementation progress and evaluate the impact of the Clean Cooking Solutions Project

View of Jumla Bazar after completion of 998kW Chukeni Khola Mini Hydropower Project (Back Cover)

Progress at a Glance: Year in Review Fiscal Year 2024/25

October, 2025

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Published by:

Alternative Energy Promotion Centre

www.aepc.gov.np

Printed in Nepal

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MESSAGE FROM THE HON'BLE MINISTER

It is my pleasure to extend warm greetings and best wishes to the Alternative Energy Promotion Centre (AEPC) on the occasion of its 29th Annual Day. This milestone provides a valuable opportunity to recognize AEPC's enduring contributions as the Government of Nepal's focal institution for renewable energy and energy efficiency. Over the years, AEPC has played a pivotal role in expanding access to modern, sustainable, and affordable energy services, particularly in remote and underserved communities, thereby improving livelihoods and advancing Nepal's inclusive and sustainable development.



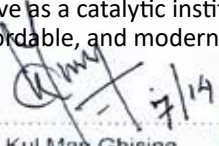
Nepal's commitment to a low-carbon and climate-resilient future is firmly rooted in national policies and reflected in our global commitments, including the Sustainable Development Goals (SDGs) and the Net Zero target for 2045. In this context, renewable energy and energy efficiency are central to achieving energy security, reducing dependence on traditional biomass and imported fossil fuels, and strengthening resilience across all sectors. AEPC's efforts in promoting decentralized renewable energy systems, clean cooking solutions, and improved energy practices have made significant contributions to these national priorities. Notably, AEPC's initiatives have helped extend modern energy services to more than 20 percent of households in geographically challenging regions demonstrating the continued relevance of off-grid energy solutions alongside grid expansion.

The Government is advancing policy and institutional reforms to further strengthen the enabling environment for the energy sector. At the same time, parallel efforts to mobilize public and private investment, enhance coordination across all tiers of government, and promote innovative delivery models remain essential to achieving our national targets, including universal electrification and access to clean cooking solutions. I appreciate AEPC's work in climate finance and international cooperation, including its accreditation to the Green Climate Fund (GCF) and continued engagement in carbon market mechanisms. These efforts are enabling Nepal to access new financing opportunities and to advance both mitigation and adaptation outcomes in alignment with our national priorities and global climate goals.

Approval of Renewable Energy and Energy Efficiency Bill, currently under the Federal Parliament, as an Act will establish strong legislative framework for promotion of renewable energy, adoption of energy efficiency and achieving clean energy transition by transforming AEPC into a new organization.

On this occasion, I would like to express my sincere appreciation to our development partners, provincial and local governments, the private sector, financial institutions, academia, and civil society organizations for their continued collaboration and support. Their collective efforts have been instrumental in advancing Nepal's renewable energy agenda and expanding access to modern, sustainable energy services across the country.

I extend my sincere appreciation to the Executive Director and the entire AEPC team for their dedication, professionalism, and unwavering commitment. Looking ahead, I am confident that AEPC will continue to serve as a catalytic institution in Nepal's clean energy transition, ensuring that the benefits of sustainable, affordable, and modern energy reach all citizens leaving no one behind.


Kul Man Ghising
Minister
Ministry of Energy, Water Resources and Irrigation

Mr. Kul Man Ghising
Hon. Minister, Ministry of Energy, Water Resources and Irrigation (MoEWRI), and
Chairperson, Alternative Energy Development Board



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MESSAGE FROM THE SECRETARY

It gives me great pleasure to extend my warm congratulations to the Alternative Energy Promotion Centre (AEPCC) on the occasion of its 29th Anniversary. Over nearly three decades, AEPCC has demonstrated steadfast commitment to advancing Nepal's renewable energy and energy efficiency agenda, serving as the Government's focal institution in this sector. Its sustained efforts have brought transformative changes to lives of people by electrifying villages, introducing clean cooking solutions and improving livelihoods for more than three and a half million households across the country. These achievements reflect AEPCC's pivotal role in promoting decentralized, affordable and sustainable energy systems that enhance energy security, reduce dependence on fossil fuels and contribute meaningfully to Nepal's climate commitments.



During the fiscal year 2081/82, AEPCC made commendable progress by extending electricity access to nearly 8,000 households and providing clean cooking solutions to over 50,000 families. It has also expanded institutional and enterprise-level clean energy and energy efficiency services while strengthening mechanisms for mobilizing climate finance and carbon revenues. These accomplishments are well aligned with the Government's national policies, strategies and development plans including 16th Plan and the Nationally Determined Contributions (NDC 3.0). Despite persistent challenges in reaching the most economically disadvantaged and geographically remote population, AEPCC continues to work with unwavering dedication to ensure that no community is left behind in the nation's clean energy transition.

Notably, AEPCC, in close collaboration with various Development Partners (DPs), has established and operationalized the Sustainable Energy Challenge Fund (SECF) under the Central Renewable Energy Fund (CREF). This initiative has significantly enhanced private sector engagement by providing Viability Gap Funding (VGF) support, thereby fostering innovation, promoting sustainable business models and strengthening the overall sustainable energy ecosystem. AEPCC's collaboration with provincial and local governments in developing policies, regulations and institutional mechanisms for renewable energy and energy efficiency also underscores its integral role in Nepal's federal energy governance framework.

I appreciate AEPCC's initiative in consolidating its achievements and lessons learned in this annual report. I am confident that this publication will serve as a valuable reference for policymakers, partners and enthusiasts. I extend my heartfelt gratitude to our DPs, provincial and local governments, private sector, financial institutions, academia, civil society, user groups and all stakeholders whose cooperation and collaboration have been vital to AEPCC's success. I look forward to our continued collaboration as we collectively strive toward sustainable, inclusive and climate-resilient energy development in Nepal.

Mr. Chiranjeev Chataut

Secretary (Energy), Ministry of Energy, Water, Resources and Irrigation (MoEWRI), and
Member, Alternative Energy Development Board

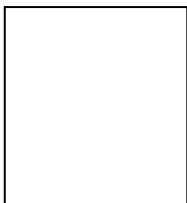


ALTERNATIVE ENERGY DEVELOPMENT BOARD



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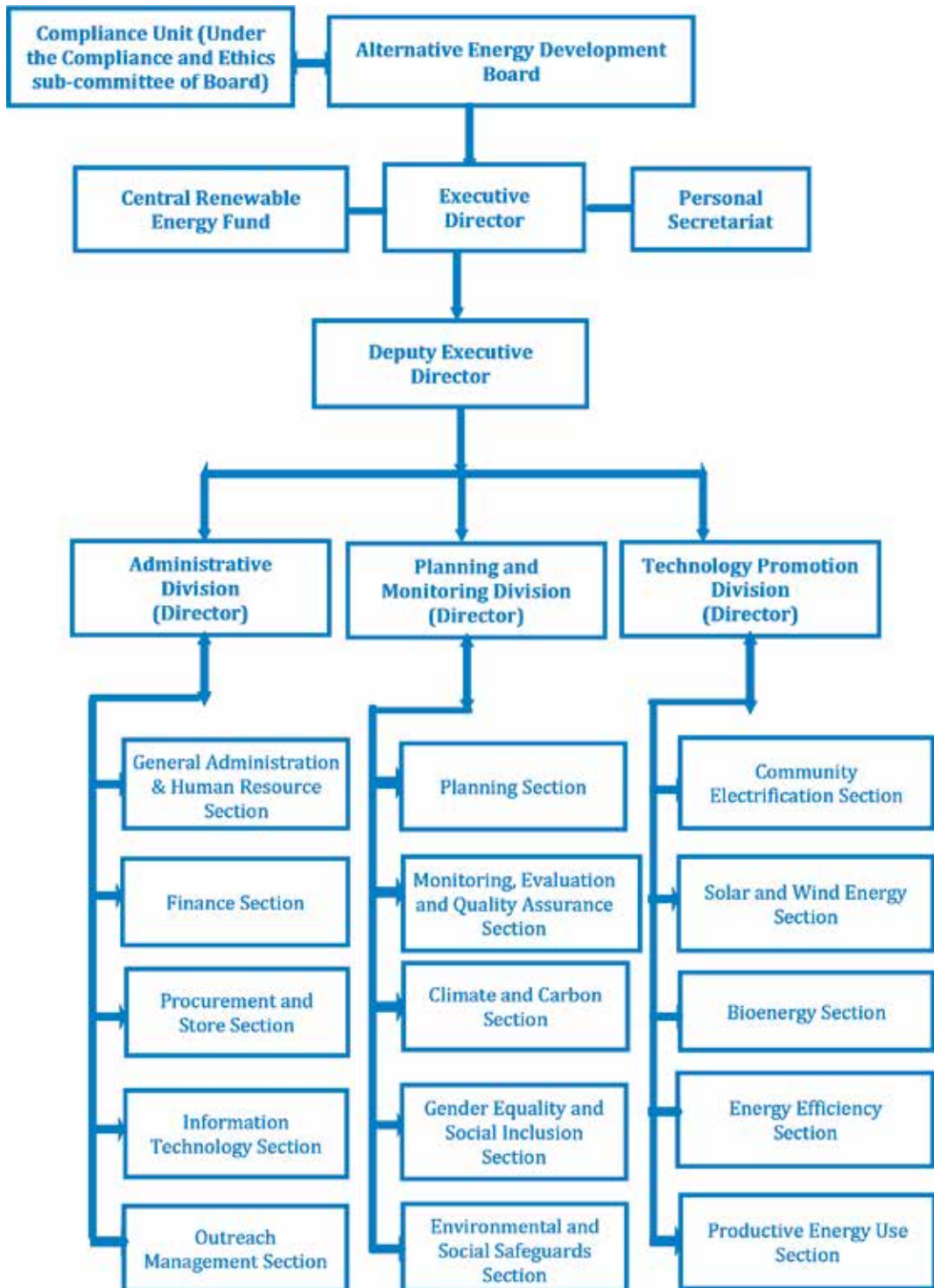
Mr. Man Bahadur Shahi
Member

Representative, Private Sector



Mr. Nawa Raj Dhakal
Member Secretary
Executive Director, AEPC

ORGANIZATIONAL STRUCTURE OF AEPC





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EXECUTIVE DIRECTOR'S REPORT

As Nepal advances its national vision for a clean, resilient and low-carbon economy, Alternative Energy Promotion Centre (AEPCC) – under the purview of Ministry of Energy, Water Resources and Irrigation (MoEWRI), Government of Nepal (GoN) – remains at the forefront of driving renewable energy (RE) and energy efficiency (EE) in the country. Established on 3rd November 1996 (18th Kartik 2053 BS), AEPCC has been partnering with provincial and local governments to deliver effective RE and EE solutions, leveraging support from GoN, development partners (DPs), private sector, financial institutions, academia and civil society organizations. AEPCC's experience with carbon projects under the Clean Development Mechanism (CDM), Gold Standard (GS) and VERRA has laid a strong foundation for future carbon initiatives under both the Paris Agreement and voluntary carbon markets. Notably, AEPCC became the first Direct Access Entity to the Green Climate Fund (GCF) from Nepal in 2019 enabling direct access to climate finance for mitigation, adaptation and cross-cutting projects.



The Constitution of Nepal, 2015 guarantees that every citizen shall have a right to live in a clean and healthy environment, as a part of fundamental rights (Clause 30), and obliges the state to ensure reliable supply of energy in an affordable and easy manner by generating and developing renewable energy and to make appropriate use of energy for the fulfilment of the basic needs of citizens (Clause 51(g)(3)). It further distributes energy-related responsibilities among the federal, provincial and local levels (Clauses 57 & 58 and Schedules 5–9), emphasizing collaboration, coordination and cooperation among all tiers of government. Guided by these constitutional mandates, AEPCC continues to align its roles and responsibilities with Nepal's federal structure and national commitment to inclusive socio-economic development.

Nepal is endowed with abundant renewable energy resources and is steadily transitioning towards a sustainable, low-carbon economy. Recognizing energy as a national priority, GoN has articulated its vision across key strategic documents, including Rural Energy Policy, 2006; Sustainable Development Goals: Status and Roadmap, 2016–2030; Biomass Energy Strategy, 2017; National Energy Efficiency Strategy, 2018; Green Hydrogen Policy, 2024; Sixteenth Plan, 2024/25–2028/29; Energy Development Roadmap and Action Plan, 2024; and Nationally Determined Contributions (NDC 3.0), 2025.

As AEPCC proudly marks 29 years of service to the Nepali people, it continues to deliver clean, affordable, and modern energy solutions at household, institution and enterprise levels. These efforts have significantly expanded the share of renewable energy in Nepal's energy mix, improved reliability and quality, reduced dependency on traditional and imported fossil fuels, and enhanced national energy security while contributing to improved livelihoods, local economic activities, employment creation, clean energy transition, emissions reduction and sustainable development. Through these interventions, AEPCC has supported cumulative number of around 3.6 million households in accessing clean energy technologies and services from rural and semi-urban communities to commerce and industries in the cities, working through over 500 companies.

Since assuming office as the Executive Director in May 2023, I have been deeply inspired by the cooperation and trust extended by all the partners and stakeholders. This collective effort reinforces AEPCC's responsibility to mainstream RE and EE across Nepal's development landscape. I express my sincere appreciation to GoN, DPs, provincial and local governments, private sector, civil society organizations, project developers, and AEPCC's dedicated staff for their unwavering commitment and cooperation.



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The fiscal year 2024/25 marked a significant phase of progress for the AEPC, as it continued to drive Nepal's transition towards a cleaner and more inclusive energy future. Guided by national priorities and GoN's RE and EE agenda, AEPC implemented its programs under two major budget headings. The Centre's core RE and EE initiatives achieved 94 percent physical and 81 percent financial progress, while the National Rural and Renewable Energy Programme (NRREP) jointly funded by GoN and DPs achieved 55 percent physical and 54 percent financial progress. The low progress under NRREP is mainly due to the inadequate co-finance availability from GoN and local governments, as well as delayed financial closures of projects and initiatives. These achievements reflect AEPC's strong institutional capacity and its commitment to delivering tangible energy solutions across the country.

During the reporting year, AEPC's interventions reached thousands of households, institutions, and enterprises, significantly improving access to modern energy services. A total of 402 kW of mini and micro-hydropower, 378 kW of solar mini-grids and 4,142 number of solar home lighting systems were installed, bringing sustainable electricity to rural communities. In parallel, 23,100 electric cookstoves, 24,320 metallic improved cookstoves, 4,386 domestic biogas plants and 9 large biogas plants were deployed, enabling cleaner and more efficient cooking energy use in households. The Centre also supported installation of 589 solar water pumping systems for drinking water and irrigation, while 208 institutional solar PV systems were installed to power schools and healthcare facilities in remote areas. Likewise, the Centre supported the installation of 12.646 MW of solar rooftop systems in commerce and industry, and 107 number of solar lights to religious and historic places. Collectively, these interventions have contributed to energy access, energy mix and reliability as well as improved quality of life and reduced dependency on traditional energy and fossil fuels.

AEPC's climate mitigation initiatives also made noteworthy contributions to Nepal's climate commitments. Through its CDM and GS projects, the Centre achieved cumulative emission reductions of 6.79 million tons of Co2 equivalent and generated carbon earning of around 36.011 million USD till date. Under the voluntary carbon market, AEPC has also registered 'Ecozone Improved Cooking Stoves Project in Nepal' in VERRA Registry, with anticipated annual emission reductions of 44,044 tons of CO2 equivalent. Building on this success, AEPC has begun developing large-scale biogas projects under the Paris Agreement's Article 6.2 Mechanism to facilitate Internationally Transferred Mitigation Outcomes (ITMOs). The Centre has also processed for the transition of existing CDM projects into Article 6.4 Mechanism, positioning Nepal to benefit from evolving international carbon market opportunities.

AEPC continued to play a pivotal role in shaping Nepal's RE and EE policy landscape. Under the leadership of MoEWRI, the Centre contributed to drafting of Renewable Energy and Energy Efficiency (REEE) Bill, an important legislative milestone that has been approved by the Cabinet and tabled in the Federal Parliament. The National Assembly already approved this bill and forwarded to the House of Representatives. However, the Bill is currently inactive due to recent political changes in September 2025 following the demonstrations led by Gen Z. Once the House of Representatives comes in place, the bill will be revived and forwarded for its approval following the due legal procedure.

Parallel to policy advancement, AEPC strengthened its collaboration with provincial and local governments to support decentralized energy planning and implementation including Municipal Energy Planning. Through targeted training, technical support, and capacity-building initiatives, AEPC assisted provincial and local governments in integrating renewable energy into their development agenda. This collaborative approach not only enhances institutional capacity at the subnational level but also ensures that RE and EE development remains aligned with people's needs and national sustainability goals.

Central Renewable Energy Fund (CREF) has been serving as the AEPC's core financial mechanism mobilizing subsidy, viability gap funding (VGF) and credit, guided by the principle of blended financing. The Sustainable Energy Challenge Fund (SECF), incorporated within CREF, serves as innovative financing mechanism

Manish



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supporting the sustainable energy projects developed by private sector by providing VGF and technical assistance. Promotion of Distributed Renewable Energy (DRE) is being proliferated through the VGF support.

AEPC's achievements during the year were made possible through strong partnerships and the continued cooperation of all the partners and stakeholders. With support from UKAid-funded Nepal Renewable Energy Programme (NREP), the Centre mobilized financial and technical assistance to private-sector-led renewable energy initiatives under SECF. Similarly, the REEEP-GREEN program supported by the German Development Cooperation (GDC) and the European Union through GIZ further strengthened SECF operations and expanded opportunities for private investment in sustainable energy.

AEPC also advanced several major DP-supported initiatives during the reporting year. These include Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal (DKTI programme) supported by GDC through KfW; South Asia Subregional Economic Cooperation (SASEC) program supported by Asian Development Bank (ADB); and Mini-Grid Energy Access Project (MGEAP) supported by World Bank. Other ongoing projects include Renewable Energy for Rural Livelihood (RERL) Project implemented with support from UNDP and ADB, as well as credit mechanisms such as the Micro Hydro Debt Fund (MHDF) supported by GIZ/EnDev and Biogas Credit Fund (BCF) supported by KfW. Promotion of Solar Technology for Economic Development (POSTED), supported by GDC through GIZ, got concluded by December 2024. Together, these partnerships have strengthened AEPC's role as a national platform for coordinated renewable energy investment and innovation.

The implementation of GCF-funded project "*Mitigating Greenhouse Gas Emissions through Modern, Efficient and Climate-Friendly Clean Cooking Solutions (CCS)*" took momentum during the reporting period. This landmark five-year program will deploy 500,000 electric cookstoves, 490,000 Tier 3+ improved cookstoves, and 10,000 biogas plants across 150 local levels in 22 districts, directly benefiting around one million households. By replacing traditional biomass-based cooking practices with clean alternatives, the program will significantly reduce greenhouse gas emissions while improving indoor air quality, public health, and gender equity in energy access. In parallel, AEPC, serving as the delivery partner for the Ministry of Finance (MoF), successfully implemented the GCF Readiness and Preparatory Support Programme to enhance national capacity for climate finance access and governance. Through this initiative, AEPC collaborated with various partners and stakeholders for developing robust pipeline of climate-resilient projects for future engagement with the GCF and other climate funds. These efforts reflect AEPC's growing role in mobilizing climate finance and integrating sustainable energy within Nepal's broader climate agenda.

Looking ahead, AEPC remains committed to accelerating Nepal's clean energy transition through integrated and inclusive approaches. In the changed context, energy access through off-grid RE solutions in remote areas, integration of DRE into national grid, promotion of grid integrated DRE for improved reliability and energy mix, adoption of energy efficiency initiatives across various sectors, and achieving clean energy transition in domestic, transport, industrial and agriculture sector remain as national priorities. As a GCF-accredited entity, AEPC aims to enhance Nepal's ability to mobilize climate finance, strengthen energy infrastructure resilience, and contribute meaningfully to national and global climate goals. The Centre will continue fostering partnerships with bilateral and multilateral agencies, international climate funds, subnational governments, private sector, civil society and all possible partners and stakeholders to make achievements as per these priorities and goals.

I extend my heartfelt gratitude to GoN, MoEWRI, DPs, private sector, financial institutions, civil society organizations, academia and all our valued partners as well as the dedicated team of AEPC for their tireless efforts and shared vision. Together, we will continue advancing Nepal's sustainable energy frontier for just energy transition and for building a sustainable, inclusive and resilient energy future for all.

Mr. Nawa Raj Dhakal
Executive Director

ABBREVIATION AND ACRONYMS

ADB	Asian Development Bank
AEPC	Alternative Energy Promotion Center
AEDB	Alternative Energy Development Board
BMZ	German Federal Ministry for Economic Cooperation and Development
CCU	Climate and Carbon Unit
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CPA	CDM Program of Activity
CREF	Central Renewable Energy Fund
DAE	Direct Access Entity
DAGs	Disadvantaged Groups
DBG	Domestic Biogas
DOE	Designated Operational Entity
DoED	Department of Electricity Development
DP	Development Partners
DRE	Distributed Renewable Energy
EE	Energy Efficiency
EJ	Exajoule
ESCOs	Energy Service Companies
ESS	Environmental and Social Safeguards
EU	European Union
FY	Fiscal Year
GCF	Green Climate Fund
GDC	German Development Cooperation
GDP	Gross Domestic Product
GEF	Global Environment Facility
GESI	Gender Equality and Social Inclusion
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (German Society for International Cooperation)
GoN	Government of Nepal
GS	Gold Standard
ICIMOD	International Centre for Integrated Mountain Development
ICS	Improved Cookstoves
IRENA	International Renewable Energy Agency
ISPS	Institutional Solar Photovoltaic System
IWM	Improved Water Mills
IWMI	International Water Management Institute
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
kW	Kilowatt
kWh	Kilowatt Hour
LFI	Local Financial Institutions
LPG	Liquefied Petroleum Gas

MEP	Municipal Energy Plan
MGEAP	Nepal Private Sector-Led Mini Grid Energy Access Project
MHDF	Micro Hydro Debt Fund
MHP	Micro Hydropower Projects
MICS	Metallic Improved Cookstoves
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MoF	Ministry of Finance
MoFE	Ministry of Forests and Environment
MSME	Micro, Small and Medium Enterprises
MW	Megawatt
NDA	National Designated Authority
NDC	Nationally Determined Contribution
NEA	Nepal Electricity Authority
NGO	Non-Government Organizations
NPC	National Planning Commission
NPR	Nepalese Rupees
NREF	National Renewable Energy Framework
NREMIS	National Renewable Energy Management Information System
NREP	Nepal Renewable Energy Program
NRREP	National Rural and Renewable Energy Program
PEU	Productive Energy Use
PoAs	Program of Activities
PPP	Public Private Partnership
RE	Renewable Energy
RERAS	Renewable Energy for Resilient Agri-Food System
RERL	Renewable Energy for Rural Livelihood
RETs	Renewable Energy Technologies
RPSP	Readiness and Preparatory Support Program
SAMS	Subsidy Administration Management System
SASEC	South Asia Sub-regional Economic Cooperation
SDG	Sustainable Development Goals
SECF	Sustainable Energy Challenge Fund
SHS	Solar Home System
SIP	Solar Irrigation Pumping system
SRT	Solar Rooftop system
TPD	Tons Per Day
TWh	Terra Watt Hour
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollars
VGf	Viability Gap Funding
WECS	Water and Energy Commission Secretariat

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Inauguration of Electric Vehicle Charging Station by
Hon. Minister. Kul Man Ghising, MoEWRI

ENERGY SECTOR OVERVIEW

1.1 THE CONTEXT

Energy remains a fundamental driver of global economic growth, social progress, and technological innovation. In 2024, the world's energy system continued to expand amid intensifying climate impacts and geopolitical uncertainty. Global energy demand rose by 2%, reaching a record 592 exajoules (EJ), with all major energy sources, fossil fuels, renewables, hydro, and nuclear, registering growth. While renewables grew nearly nine times faster than total energy demand, fossil fuels still accounted for 87% of the global energy mix, underscoring the persistence of a disorderly transition.

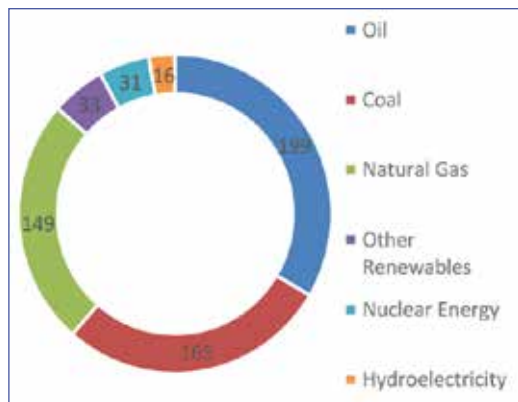


Figure 1: Global Energy Supply 2024 in Exa Joule, (Adapted from Energy Institute, Statistical Review of World Energy, 2025, 74th Edition)

Emissions from energy reached an all-time high of 40.8 gigatonnes of CO₂ equivalent, increasing by 1% over 2023. Although Europe and North America recorded emission declines, rising demand in Asia, particularly from China and India, accounted for most of the global increase. Oil remained the largest

single source of energy, meeting 34% of global demand, followed by natural gas (29%) and coal (28%).

Electricity demand grew by 4%, outpacing total energy growth and signaling accelerated electrification. Wind and solar generation expanded by 16%, increasing their combined share of global electricity to 15%. Solar capacity additions outpaced wind by a ratio of 4:1, reaching 1,865 GW globally, while wind capacity totaled 1,135 GW. Hydropower generation rose 4%, its largest annual increase since 2010, contributing 14% of global electricity. China continued to dominate the global energy landscape, accounting for 57% of global renewable additions and nearly half of total electricity growth, while also maintaining the world's highest coal use. This duality reflects the broader global challenge: simultaneous record highs in both fossil fuel and renewable use.

The 2024 trends highlight a world in an "age of energy addition," where progress toward decarbonization coexists with rising energy demand and emissions, reinforcing the urgency for a more coordinated, secure, and equitable energy transition. As nations increasingly pursue electrification and low-carbon technologies, the global energysystem is entering a phase defined by complexity, regional divergence, and technological acceleration. Ensuring universal access to clean, reliable, and affordable energy will require balancing energy security with climate ambition, anchoring investments in renewables, energy efficiency, and resilient energy

systems that can sustain growth while reducing emissions.¹

1.2 NATIONAL ENERGY CONSUMPTION SCENARIO

The energy demand and supply situation in Nepal highlights a persistent imbalance between the two. As energy serves as a cornerstone for national economic growth and socio-economic development, any shortfall in supply can constrain progress across sectors. It is therefore essential to adopt strategic planning and targeted investment to bridge this gap and ensure future energy security.

In FY 2023/24, the total energy consumption in Nepal was 527.54 PJ and has seen a decline of 0.91% as compared to the previous year. The traditional fuel consumption reduced by 9.10% while coal consumption and petroleum increased by 18.23% and 10.77% respectively. The use of traditional fuels has been substituted by the use of grid electricity which has seen an increase of 18.61% while the renewable energy has seen an increase in 9.64%.²

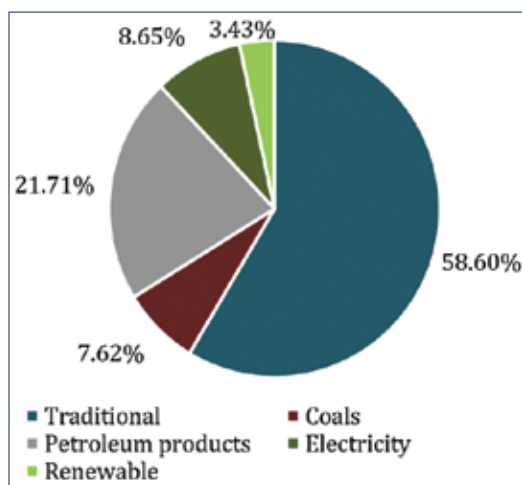


Figure 2: Energy Consumption Status 2023/24, (adapted from MoF, Economic Survey, 2081/82)

Nepal's lack of fossil fuel resources

makes it heavily dependent on imports, placing a substantial burden on the nation's economy and underscoring the need for alternative energy strategies. In 2023/24 fossil fuel remained the top import and accounted for 21.71% of the total import.³ In FY 2023/24, Nepal imported 1,390,000 kL of Diesel, 693,000 kL of petrol and 524,000 metric tons of LPG.⁴ Nepal's still has a heavy dependence on imported fuels. This has created a vulnerable situation and major contributors in widening the trade deficit. Periodically, the country has faced energy security risks. Strengthening the economy and protecting national sovereignty will require a strategic shift toward reducing reliance on imported fossil fuels through enhanced hydropower and renewable energy production and diversification.

The residential sector accounts for 60.75% of Nepal's total energy consumption. In comparison, the industrial sector consumes 20.91%, followed by the transportation and commercial sectors at 10.43% and 5.04% respectively. Energy consumption in the agriculture sector is 0.95%, while the construction and mining sectors together account for 1.92%.⁵

1.2.1 National Electrification Status Access

As of mid-March 2025, the percentage of the population with access to electricity including renewable energy has reached 99% whereas, 8.5% percent of population has access to renewable energy sources for electricity.⁶ Similarly, per-capita electricity consumption has increased to 412 kWh. Comparatively, total installed capacity has increased by 11.07% since the last fiscal year, now

3 ibid

4 ibid

5 Water and Energy Commission Secretariat (2024): Energy Sector Synopsis Report

6 ibid

1 Statistical Review of World Energy, 2025, 74th edition

2 Ministry of Finance (2025): Economic Survey 2081/82

standing at 3,602 megawatts (MW). Out of this, hydroelectricity contributes 3,336 MW, solar plants contribute 117 MW, electricity generated from renewable energy from AEPC contributes to 90 MW, thermal power plants contribute to 53.4 MW, sugarcane mills cogeneration produce 6 MW⁷. As of FY 2024/25, AEPC has also achieved notable progress in renewable energy deployment, with a cumulative installation of 40.655 MW of micro and mini-hydropower and 49.345 MW from solar energy. Nepal's power sector is set for significant expansion to meet its growing energy demand and development ambitions. By 2035, Nepal envisions increasing the total installed capacity to 28,500 MW, alongside boosting annual per capita electricity consumption to 1,500 units.⁸

1.3 SECTORAL EVOLUTION

The Seventh Plan, spanning from 1985 to 1990, incorporated alternative energy into the national planning framework and established a policy to promote various alternative energy sources, with a particular focus on biogas, solar, and wind energy. Additionally, the plan also embraced policies to encourage the adoption of improved cookstoves (ICS), small water turbines, and improved water mills (IWM). To achieve the goals outlined in these policies, the plan introduced a strategy involving the private sector and the provision of grants or loans to consumers to effectively promote these technologies. Furthermore, the plan placed significant emphasis on research, studies, and the development of technical expertise. It marked the introduction of subsidies for technology adoption (such as biogas, ICS, IWM, and small turbines) as well as for research and training efforts.

The Eighth Plan, spanning from 1992 to 1997, represents the first plan of Nepal's democratic government following the restoration of democracy in 1990. This plan upheld the alternative energy agenda established by its predecessor and recognized the necessity of establishing an agency dedicated to alternative energy to oversee and coordinate various energy-related initiatives. It placed a strong emphasis on rural electrification, with a focus on generating electricity through micro-hydro projects. The plan also formalized the framework for the development of various alternative energy sources, including micro-hydro, biogas, solar, wind, and biomass energy. The eighth plan envisioned the implementation of the alternative energy development program through the active involvement of the private sector. The program was designed to be executed in close collaboration with entities such as the Agricultural Development Bank, other financial institutions, private sector entities, and non-government organizations. Additionally, the plan continued to allocate government funding to support the alternative energy sector.

During the Ninth Plan period, which extended from 1997 to 2002, the development of rural energy was acknowledged as a means to create more employment opportunities. The primary objective was to build a strong economic foundation, improve living standards in rural areas and ensure environmental sustainability. To achieve these goals, the plan implemented a policy that encouraged the active involvement of the private sector, as well as national and international nongovernmental organizations, in the research and development of rural and alternative energy technologies. Furthermore, the plan established the

⁷ *ibid*

⁸ Ministry of Energy, Water Resources and Irrigation (2025): Energy Development Roadmap

Alternative Energy Promotion Center (AEPC) as an institution responsible for collecting and maintaining data related to alternative energy technologies. It focused a particular emphasis on the expansion and promotion of ICS, microhydro projects, solar energy, and other isolated renewable energy (RE) technologies. Additionally, the plan introduced the concept of decentralized energy planning and formulated a policy to formalize AEPC as the key agency for promoting alternative energy in Nepal. It also aimed to attract private sector investment and facilitate the grid interconnection of rural alternative energy systems.

The Tenth Plan, covering the period from 2002 to 2007, introduced specific numerical goals for the implementation of RE technologies. It embraced a long-term vision aimed at accelerating economic growth, increasing employment opportunities, and ensuring environmental sustainability. Rural Energy Policy, 2006 was introduced by the government as the guiding policy for the sector. Similarly, the plan envisioned the commercialization of alternative energy technologies and the replacement of traditional energy sources with modern alternatives. To effectively pursue this adopted vision and achieve the established targets, the plan proposed the creation of a Rural Energy Fund (REF), with the intention of eventually extending its reach to the district and village levels. It also outlined separate programs for the promotion of various RE sources, including biogas, solar energy, micro-hydro, wind energy, and bio-energy, to ensure the effective attainment of the set objectives.

When the Three-Year Interim Plan for the years 2007 to 2010 was devised, the RE sector in Nepal had already established the necessary institutional,

organizational, and operational framework for its implementation. This plan continued the practice of setting specific targets for different RE technologies within the sector. In addition to carrying forward the long-term vision set by previous planning periods, this plan introduced a vision to generate financial resources by developing RE technologies as Clean Development Mechanism (CDM) projects, capitalizing on their potential to reduce greenhouse gas (GHG) emissions. Furthermore, it placed a strong emphasis on gender and social inclusion, aiming to increase the involvement of women and individuals from all castes and classes in the promotion and utilization of RE resources. The plan's core focus was on expanding these technologies as a means to enhance energy access, improve livelihoods, attract investment from non-state actors, and provide greater access to information. Of particular significance, the plan laid the conceptual groundwork for the establishment of the Central Renewable Energy Fund (CREF) to ensure the effective and sustainable development of RE.

The Three-Year Plan for the period 2010 to 2013 embraced a long-term vision up to 25 years aiming to achieve a 10% contribution of RE in the overall energy mix, with the objective of ensuring that 30% of the population with access to electricity would be powered by renewables. It continued the implementation of technology-specific programs that were initiated by previous plans, with a particular focus on promoting and expanding off-grid RE systems. Furthermore, the plan adopted a strategic approach centered on implementing integrated programs that addressed broader economic and social development as well as environmental

sustainability. It emphasized sectoral coordination, research, and technology transfer. The plan also introduced policies geared towards serving urban populations, with a focus on promoting urban solar projects and waste-to-energy initiatives targeted at commercial and municipal scales. Additionally, the plan emphasized the institutionalization of the CREF, the promotion of RE-based enterprises, and the grid interconnection of RE projects.

The Thirteenth Plan, covering the period from 2013 to 2016, implemented a strategy that focused on research and development, along with the technology transfer on RE. It also emphasized the mobilization of both internal and external resources, including revenue from carbon initiatives. The plan aimed to advance research, development, and the efficient management of energy within renewables. Furthermore, one of the key objectives of the plan was to empower local bodies to plan, execute, monitor, and evaluate activities related to RE. Additionally, it introduced policies to put into operation the CREF, manage the disposal of used lead acid batteries generated from solar-based technologies, and utilize solar and wind technologies for water pumping purposes, among other initiatives.

The Fourteenth Plan, spanning from 2016 to 2019, aimed to extend access to electricity to an additional 9% of the population by harnessing solar, mini and micro hydro, as well as wind resources. Additionally, the 14th plan had the objective of promoting the installation of 0.2 million units of biogas digesters and 1.065 million units of ICS (NPC, 2016)⁹.

Nationally Determined Contributions (NDC) 2016 of Nepal primarily

emphasize the advancement of RE and EE as measures to address and mitigate the impacts of climate change.

The Fifteenth Plan for the period 2019 to 2023, aimed to increase the electricity generation installed capacity to 5,820 MW and raise per capita annual consumption to 700 kWh. Moreover, it sought to expand the share of RE in the energy mix to 12% while limiting the consumption of solid fuels to 50% by 2023/24. Additionally, the 15th Plan also targeted the installation of 200,000 household biogas plant and 500,000 improved cookstoves. Further the plan also aimed to increase the production rate of the Bio-briquette pellet to at least 20,000 MT per year.¹⁰

Second Nationally Determined Contribution (NDC), 2020 has set forth ambitious targets to transition towards a more sustainable and environmentally friendly energy landscape. By the year 2030, the country aims to have a significant 15% of its total energy demand fulfilled through RE sources, signifying a substantial shift away from fossil fuels. Additionally, in the realm of transportation, Nepal plans to make substantial strides by targeting 25% share of electric vehicles on new vehicle purpose by 2025, with an even more ambitious goal of encompassing 90% electric vehicles by 2030. Turning to residential cooking, the NDC outlines a vision for the future where 25% of households will be using electric stoves by 2030 as primary mode of cooking. To achieve this, the plan includes installing 500,000 improved cookstoves by 2025, with a particular emphasis on rural areas where traditional cooking methods prevail. Furthermore, by 2025, Nepal intends to install an additional 200,000 household biogas plants and

⁹ National Planning Commission (NPC), 2016: The Fourteenth Plan (2016/17-2018/19)

¹⁰ National Planning Commission (NPC), 2020: The Fifteenth Plan(2018-19-2023/24) https://www.npc.gov.np/images/category/15th_plan_English_Version.pdf

500 large-scale biogas plants, thereby contributing to cleaner and more sustainable energy practices in the country.

Nationally Determined Contribution (NDC) Implementation Plan 2023 Nepal's NDC Implementation Plan outlines the country's ambitious climate goals and the financing needs associated with achieving them. The NDC implementation plan estimates that USD 33.05 billion is needed between 2021 to 2030 to implement the country's NDC commitments. This includes USD 3.4 billion in unconditional financing, which the government of Nepal has pledged to mobilize domestically, and USD 29.65 billion in conditional financing, which is contingent on international support. The NDC implementation plan has further disaggregated the financing needs based on its targets in the Energy, AFOLU, Waste, IPPU, Urban Settlements, GESI and Good Governance. The majority share of the funding needs is associated with commitments in the Energy sector, amounting to USD 22.19 billion (67.14%), followed by the AFOLU sector at USD 7.11 billion (21.50%).

1.4 PREVAILING POLICY AND LEGAL FRAMEWORK

The Constitution of Nepal (2015) includes provisions that mandate the government to formulate policies concerning the safeguarding, advancement, and utilization of natural resources (Part 4, Article 51 g). The constitution also instructs the government to establish policies aimed at ensuring a dependable and affordable energy supply that can be easily accessed, and to effectively utilize energy resources to meet the fundamental requirements of citizens, primarily by generating and cultivating renewable energy sources¹¹.

Consequently, this constitutional framework obligates the government to create and execute policies and strategies and legal framework focused on the promotion of RE and adoption of energy efficiency (EE) within the nation.

Rural Energy Policy (2006) is centered on diminishing reliance on conventional energy sources and preserving the environment. It aims to achieve this by enhancing access to clean and affordable energy in rural areas. Additionally, the policy seeks to elevate the living standards of rural populations by fostering job creation and productivity through the advancement of rural energy resources.

Sustainable Development Goals (SDGs) (2015) focus on achieving near-universal access to modern energy while drastically increasing efficiency and the use of renewable sources. The primary goals are to ensure 99% of the population has access to electricity and to raise the Electricity consumption (kWh per capita) to 630 kWh. The country aims for a major energy transition by increasing the share of renewable energy in total energy consumption to 50%. This transition is linked to a reduction in the use of traditional fuels, targeting only 10% of households to be using solid fuels as a primary source of energy, while LPG for cooking/heating remaining at 40%. Finally, the plan has ambitious efficiency and sustainable transport goals, including achieving 100% electric vehicles in public transport and ensuring that the usage of LED efficient lighting systems and higher efficiency appliances also reaches 100%.

Biomass Energy Strategy (2017) seeks to bolster the utilization of biomass energy as a dependable, cost-effective, and sustainable energy source to meet Nepal's growing energy requirements. This involves augmenting the production

11 The Constitution of Nepal (2015)

of sustainable biomass energy by harnessing agricultural, forest residues, and organic waste resources, thereby improving access to clean cooking solutions. The strategy also aims to enhance the efficiency and effectiveness of biomass energy utilization and production.

National Energy Efficiency Strategy (2018) outlines its vision to contribute to energy security by enhancing energy access through the efficient utilization of existing energy resources. Its mission is to promote EE through the effective implementation of EE programs, establishing a policy, legal, and institutional framework. The ultimate goal is to double the average rate of EE improvement in Nepal, increasing it from the 0.84% per year observed during the period of 2000-2015 to 1.68% per year by the year 2030 A.D.

The White Paper of Ministry of Energy, Water Resources and Irrigation (2018)¹² outlines the status of RE in Nepal. It highlights that over 55 MW of electricity is generated from renewable sources, benefiting approximately 3.6 million individuals. The white paper introduces a policy initiative to create a challenge fund aimed at fostering the development of 100 to 500 kW solar energy projects at the local level. Additionally, it underscores the objective of elevating the Alternative Energy Promotion Center (AEPC) to become a "Center for Excellence" in the RE sector. Another key focus is the establishment of a national carbon market.

National Climate Change Policy (2019) has set the goal of contributing to the socioeconomic well-being of society by building resilience to climate change. It follows a thematic approach in eight thematic sector, including agriculture

and food security, forest and biodiversity conservation, water resources and energy, rural and urban settlement, industry and infrastructure, tourism and heritage, health and sanitation, and disaster risk management. Additionally, it addresses four cross-cutting areas encompassing gender equality and social inclusion, public awareness and capacity development, research and technical advancement, and climate finance management. This policy aims to enhance capacity in climate change adaptation, promote a green economy, mobilize both national and international climate finance, and formulate strategies, regulations, and guidelines at all levels of government.

Environment Policy (2019) is designed to safeguard citizens' entitlement to a clean and wholesome environment by focusing on pollution control, effective waste management, and the development of green spaces. The policy outlines strategies for mitigating environmental impacts, such as promoting the use of electric vehicles and renewable energy technologies. Additionally, it formulates strategies for adapting to environmental changes by expanding programs like "Climate Resilient Village," advocating sustainable forest management practices, and implementing integrated watershed management practices. The policy also incorporates a strategy for climate-resilient infrastructure to minimize losses and damages associated with disasters.

Long Term Strategy for Net Zero Emissions (2021) outlines an ambitious vision characterized by impactful policy decisions, sweeping social changes, and innovative technological advancements. This vision is aimed at steering the nation toward a carbon-neutral, inclusive, and climate-resilient future. The strategy was formulated with the primary

12 White Paper of Ministry of Energy, Water Resource and Irrigation

objective of charting out pathways for reducing greenhouse gas emissions, ultimately leading to the achievement of net-zero carbon emissions by the year 2045.¹³ This monumental goal will be realized through a series of strategic actions, including the promotion of clean energy adoption, enhanced energy efficiency measures, the expansion of carbon sequestration initiatives, the advancement of circular economy practices, and substantial investments in technologies that are both carbon-neutral and compatible with a circular economy.

National Adaptation Plan (2021)

is designed to assist the nation in achieving the established goals of the NAP process as outlined within the framework of the UNFCCC. These objectives include the reduction of vulnerability to the adverse impacts of climate change through the enhancement of adaptive capacity and resilience. Furthermore, it seeks to facilitate the systematic integration of climate change adaptation measures into relevant policies, programs, and activities in a coherent manner. This integration is particularly focused on development planning processes and strategies across various sectors, at appropriate levels. The NAP has been strategically developed to enable the country to effectively respond to the challenges posed by climate change over different timeframes, including the short term (until 2025), medium term (until 2030), and long term (until 2050).¹⁴

RE Subsidy Policy (2022) has a core objective of achieving widespread access to clean, dependable, and cost-

effective renewable energy sources by the year 2030. This goal is to be realized by both extending the reach of dependable, and cost-effective renewable energy sources by the year 2030. This goal is to be realized by both extending the reach of renewable energy technologies and diminishing dependence on conventional and commercial energy resources. To enhance accessibility to renewable energy technology, the policy calls for a reduction and recalibration of subsidy amounts. Moreover, the policy underscores the importance of empowering women and indigenous communities by creating employment opportunities through the utilization of renewable energy technology. This proactive approach is intended to foster the development of a thriving market for renewable energy, further advancing the nation's clean energy goals.

National Renewable Energy Framework (2022)

serves as a comprehensive mechanism designed to unify and streamline policies and programs within the renewable energy sector, all working in alignment with a predefined set of strategic objectives. This framework represents a collaborative effort between the Government of Nepal (GoN) and Development Partners (DPs). Its primary objective is to harmonize the efforts of the GoN, DPs, and other organizations, channeling them towards a shared overarching vision through the implementation of an integrated results framework. The RE Framework is instrumental in facilitating joint coordination and the monitoring of outcomes across various renewable energy initiatives. It also plays a pivotal role in engaging

13 Government of Nepal (2021): Long Term Strategy on Net- Zero Emissions

14 Ministry of Forests and Environment (2021): National Adaptation Plan

stakeholders and mobilizing financial resources to support the realization of its objectives.

Sixteenth Plan has been adopted by the GoN for a period from FY 2024/25 to 2028/29. The plan envisions to fulfill the aspirations of the sustainable peace, good governance, development and prosperity through the federal democratic republican system of governance as outlined in Nepal's Constitution. The plan aims to increase the installed power plant capacity to 11,769 MW and increase the electricity access to 100%. The plan further aims to install an additional 10 MW of micro and small hydropower, 50,649 domestic biogas plants, 299 institutional biogas/waste to energy plants, 500,020 improved cookstoves and 945,180 electric cookstoves with its span. Further the plan also targets to improve the rate of energy efficiency from 0.57% to 1.68%.

Green Hydrogen Policy 2024 seeks to leverage RE sources, including hydropower, for the production of green hydrogen, with the goal of mitigating the effects of climate change and transition to a low-carbon economy. Additionally, the policy aims to reduce reliance on petroleum products by promoting the generation, storage and transportation of green hydrogen. Furthermore, it focuses on utilizing green hydrogen in the production of chemical fertilizers and other industrial processes, while also fostering research and innovation in green hydrogen technologies.

Energy Development Roadmap 2024 establishes clear goals for energy infrastructure, trade, and consumption, primarily targeting the year 2035. Key goals include achieving 100% access to electricity, and significantly increasing the Annual Per Capita

Electricity Consumption to 1,500 units. Infrastructure targets for 2035 include expanding the Transmission System to 17,446 circuit kilometers and exporting 15,000 MW of electricity. The roadmap also outlines policies across sectors, focusing on Grid Integration of off-grid systems, implementing National Energy Security Audits, developing policies to utilize the potential of Green Hydrogen, and mandating the development and enforcement of Standards & Labelling for electrical appliances to enhance energy efficiency (EE) across all consumption sectors.

Nationally Determined Contribution (NDC 3.0) 2025 outlines ambitious targets for climate mitigation and energy transition, with key goals set for 2035. The plan envisions that 15% of the total energy demand will be met through clean sources. The power sector is guided by an overarching goal of achieving a Total Installed Capacity of 28,500 MW by 2035. The plan sets robust quantified targets focused on expanding clean energy access and efficiency by 2035. In Clean Cooking and Heating, the target is to transition 2.1 million households and 15,000 institutions to use electric cookstoves. This is supported by expanding the use of Improved Cookstoves (ICS) to 1 million households, Metallic ICS (MICS) to 100,000 households, and household-level biogas to 652,770 households. Furthermore, the plan mandates a major shift in transport, aiming for 95% of all private passenger vehicle sales and 90% of public passenger vehicle sales to be Battery Electric Vehicles.

To achieve these goals, the NDC 3.0 prioritizes several policy and structural measures. By 2030, national policies and acts specifically on RE and EE will

be formulated. This is accompanied by efforts to scale up local implementation, with 400 local governments expected to implement Municipal Energy Plans by 2035. Measures to promote Distributed Renewable Energy (DRE) and clean cooking, including through carbon financing, will be strengthened. In Energy Efficiency, the focus is on buildings and appliances: energy-efficient building codes will be implemented, and standardized labeling for household electrical appliances will be developed by 2030. Lastly, the plan supports the transition of institutions and industry, promoting Institutional Solar Photovoltaic Systems (ISPS) in 2,800 health care facilities by 2035 and incentivizing certified energy efficiency upgrades and the conversion of 70% of industrial boilers to electricity-based systems.

Renewable Energy and Energy Efficiency Bill, after receiving approval from the Cabinet, the bill was also approved by the National Assembly of the Federal Parliament and submitted to the House of Representatives. Due to dissolution

of the parliament in September 2025, the bill is currently inactive and it will be revived and put in approval process once the House of Representative is in place.

National and International Commitments Nepal is the member of the Paris Agreement and similarly Nepal has made commitments towards “Tripling Renewable Energy Capacity and Doubling the rate of improvement of Energy Efficiency”; “Electrifying Cooking (Global eCooking Coalition, GeCCo)”; “Powering Past Coal Alliance (PPCA) in COP 28. Nepal has received international recognition in the field of RE by ratifying the statute of the International Renewable Energy Agency (IRENA). Nepal became the 153rd nation to endorse the IRENA statute. In addition, Nepal has officially joined the International Solar Alliance (ISA) as its 101st full member. By joining the ISA, Nepal takes a major step in its dedication in promoting RE particularly solar and supporting global efforts to combat climate change.





National Forum on Carbon Financing Opportunities (2025) in Energy Projects hosted by AEPC

ALTERNATIVE ENERGY PROMOTION CENTRE

2.1 INTRODUCTION

The Government of Nepal has long acknowledged the critical role of renewable energy technologies (RETs) in addressing the energy requirements of rural communities, officially starting with the Seventh Five Year Plan in the 1980s. This early recognition established a sustained policy trajectory, leading to the continuous promotion and integration of RETs across various national development plans and programs.

To facilitate renewable energy goals, the Alternative Energy Promotion Centre (AEPC) was established on November 3, 1996. Operating as a semi-autonomous government body under the Ministry of Energy, Water Resources, and Irrigation (MoEWRI), AEPC is overseen by the Alternative Energy Development Board (AEDB), which includes representatives from government, the private sector, NGOs, and financial institutions. The AEPC's Board serves as the governing body responsible for the overall management and oversight of the activities undertaken by AEPC in pursuit of its mission.

2.1.1 Mandate

AEPC is primarily responsible for advancing various Renewable Energy (RE) sources, including micro/mini hydro (up to 10 MW), solar, wind, biomass, and biogas. Its mandate significantly expanded following the Seventh Amendment (2018) to the AEPC Formation Order 2053 (1996). In addition to its original duties, AEPC

is now entrusted with crucial tasks such as enhancing Energy Efficiency (EE), accredited entity to the Green Climate Fund, executing carbon-related initiatives, and building the capacity of provincial and local governments to implement both RE and EE projects.

2.1.2 Vision Statement

"An institution recognized as a regional/ international example of promoting large-scale use of renewable and sustainable energy including EE and a national focal point for resource mobilization". The focus is to make AEPC recognized as an active institution promoting Renewable Energy Technologies and Energy Efficiency in the region.

2.1.3 Mission Statement

The mission of AEPC is to make renewable energy and energy efficiency mainstream resources through energy accessibility, knowledge and adaptability contributing for the improved living conditions of people in Nepal and combatting climate change globally.

2.1.4 Strategic Objectives

The main objectives of the AEPC are as follows:

- To popularize and promote the use of alternative/renewable energy technology.
- To raise the living standard of the rural people.
- To protect the environment.
- To develop the commercially viable

alternative energy industries in the country.

- To promote EE across all sectors.

2.2 AEPC's WORKING APPROACH

2.2.1 Working Modality

AEPC adheres to a Public-Private Partnership (PPP) Model driven by a Demand-Based Approach. The public sector's role encompasses support functions like subsidy delivery, capacity building, technical/financial assistance, coordination, and quality assurance. The private sector is tasked with core business activities: manufacturing, supply, installation, and post-installation services for renewable energy technology. Beyond this partnership, AEPC has been instrumental in clean energy and climate actions by partnering with sub-national governments and national and regional NGOs to successfully deliver services.

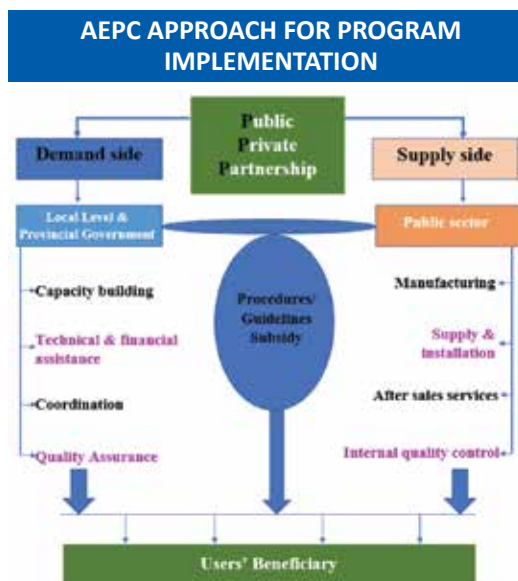


Figure 3: PPP Model of Renewable Energy Service Delivery

Since the transition to a federal system following the new constitution, AEPC has sharpened its focus on

collaboration, actively engaging with all seven provincial governments and 753 local governments. To advance RETs nationwide, AEPC maintains an extensive partnership network at all levels, working closely with relevant ministries and their departments, the private sector, national financial institutions, NGOs, civil society, academia, and community/user groups. Over 28 years of operation, AEPC has successfully cultivated collaborative partnerships with numerous Development Partners (DPs), multilateral banks, and intergovernmental organizations. Crucially, AEPC is accredited as a Direct Access Entity (DAE) of the Green Climate Fund (GCF) and is implementing a GCF funded project, "Mitigating GHG emissions through modern, efficient, and climate-friendly clean cooking solutions." Furthermore, AEPC has served as the delivery partner for the Ministry of Finance (the National Designated Authority for GCF) in implementing the GCF Readiness and Preparatory Support Program, consistently contributing to capacity building, policy support and pipeline development to enhance access to available international climate and carbon finance resources.

2.2.2 Promotion of Renewable Energy

AEPC is carrying out several initiatives and schemes aimed at promoting the use of these renewable energy systems across the country. It includes

- Mini and Micro Hydropower,
- Improved Water Mill;
- Solar Photovoltaic and Solar Thermal;
- Bioenergy (Clean Cooking Technologies, ICS, Biogas, Waste to Energy)
- Wind Energy

Through carbon projects, AEPC has been a strong advocate for RETs, initially concentrating on the Clean Development Mechanism (CDM) and the voluntary market such as the Gold Standard (GS). The current CDM portfolio includes biogas, micro-hydro, improved water mills, and improved cookstoves. Looking forward, AEPC is progressively strategizing to expand its carbon project initiatives by integrating additional RETs under the frameworks established by the Paris Agreement under the compliance and voluntary carbon markets.

2.2.3 Collaboration with Provincial and Local Governments

The outreach function is crucial within the federal system, a role effectively executed by AEPC through the signing of Memoranda of Understanding (MoUs) with the energy-portfolio ministries in all seven provinces. AEPC places a strong emphasis on providing technical assistance, capacity building, and orientation on RE and EE to both provincial and local authorities for the planning, development, implementation, and monitoring of their respective programs. Furthermore, AEPC actively assists provincial governments in preparing their own energy plans and policies. For local governments (LGs), AEPC collaboratively developed the Municipal Energy Plan (MEP) methodology to ensure best available technologies, secure energy for community services, support local enterprises, and meet national goals and international commitments. MEPs help LGs to identify the most cost-effective solutions, considering life cycle costs, among options like grid extension, mini/micro hydro, solar PV/thermal, biogas, and biomass, while integrating local EE measures. So far, 83 municipalities have prepared

their energy plans with AEPC's and its project's support.

2.2.4 Promotion of Productive Energy Use

Promoting Productive Energy Use (PEU) is key to transforming RE provision into tangible economic results for Micro, Small, and Medium Enterprises (MSMEs). These positive outcomes, such as increased product outputs, enhanced quality, and improved productivity, directly boost income for MSMEs, driving entrepreneurship and reducing poverty in Nepal's rural areas. Consequently, AEPC actively strives to encourage PEU to establish MSMEs, thereby generating employment and income opportunities for both rural men and women. For any RE project's sustainability, PEU is vital, as increased local income and job creation enhance residents' capacity to afford and invest in RE systems. This mutual benefit also improves the load factors of the energy systems powering the productive components, ensuring the long-term sustainability of both the RE system and the local economy.

2.2.5 Financing Instruments and Mechanism

AEPC's primary historical focus has centered on administering subsidies for various RETs. To finance these RETs, the Central Renewable Energy Fund (CREF) was established as AEPC's core financial mechanism, guided by the principle of blended financing with subsidies and credit facilities. As the central financial mechanism, CREF is responsible for effectively delivering subsidies, viability gap funding, credit guaranteeing and credit to the RE sector. CREF's financial management is executed through a transparent and competitive selection process involving commercial and development banks. A designated Handling Bank (a Class A

commercial bank) oversees wholesale lending to Partner Banks, manages subsidies and viability gap funding, and handles investment management. Qualified Partner Banks disburse CREF funds to eligible RE projects, and must establish strategic partnerships with Local Financial Institutions (LFIs) to expand their reach. These selected banks assume the credit risk, manage loan appraisal and supervision. The CREF Secretariat supports these banks with capacity building to enhance their outreach, efficiency, infrastructure, and the stability of their financial systems. Additionally, the Viability Gap Funding (VGF) support under the Sustainable Energy Challenge Fund (SECF) is implemented through CREF with contributions from the British Embassy Kathmandu, Government of Nepal and various development partners. Recognizing the innovative blended financing concept, its transparent processes, benefits and sustainability aspect, other DPs such as GIZ, EU, KfW have also started contributing into SECF modality following its established mechanisms. SECF focuses on correcting market imperfections, ensuring projects demonstrate a double bottom-line impact (social and economic), and prioritizing proposals that show value for money and leverage resources, especially those addressing Gender and Social Inclusion (GESI). The fund provides diverse support, ranging from capital investment for PPP projects with local governments and market development support for technology aggregation, to viability gap incentives (such as interest rate buydowns) for grid-tied captive projects and a Loan Guarantee Mechanism to ease collateral requirements for borrowers.

2.2.6 Compliance and Ethics

AEPC's integrity mechanism is rooted in the national legal framework and is

formalized through dedicated internal structures. As a government entity, its financial and ethical conduct is guided by comprehensive national legislation, including Acts and Regulations on Financial Procedure and Fiscal Accountability, Public Procurement, Prevention of Corruption, and Right to Information, *inter-alia*. The internal financial management is overseen by Chief Account Comptroller.

Compliance and Ethics Sub-committee and Compliance Unit was established in 2016 to oversee and ensure the effectiveness of internal controls. The five-member Compliance and Ethics Sub-committee is coordinated by an AEPC board member, reporting directly to the Board (AEDB) on areas of compliance and ethics. This system is further reinforced by an Internal Control Committee and a Grievance Handling Committee.

To strengthen internal governance, AEPC formalized several internal guidelines: the Financial Discipline and Good Governance Regulation, a Financial Mismanagement and Corruption Prevention Resource Book for step-wise guidance, and specific procedures on the prevention of Sexual Exploitation, Abuse, and Harassment (SEAH). The integrity framework is operationalized through specific techniques designed to ensure transparency and accountability.

2.2.7 Environmental and Social Safeguards

In adherence to Nepal's Environment Protection Act and Environment Protection Rules, AEPC implements the Environmental and Social Safeguards (ESS) Policy. This policy's core principle is the prevention and alleviation of adverse environmental and social impacts. It mandates that environmental and social considerations be an integral part

of the project lifecycle, allowing suitable mitigation measures to be employed for maximum impact minimization.

2.2.8 Energy Efficiency

After the approval of the National Energy Efficiency Strategy in 2018, AEPC was mandated as the government entity responsible for EE in Nepal through the 7th amendment of AEPC's Formation Order. AEPC is now responsible for advancing EE and facilitating communication among various national institutions and stakeholders engaged in EE programs and initiatives.

2.3 HUMAN RESOURCE

At present, AEPC maintains a workforce of 54 permanent staff positions. In addition to its in-house core team, AEPC also engages specialists in different field including renewable energy, environmental safeguards, social safeguards, gender equality, and climate change under its various projects and programs it carries out.

2.4 SECTORAL POLICIES

Since its inception, AEPC has evolved into a dynamic organization dedicated to providing RE and EE services to beneficiaries. AEPC has consistently played a leading role in assisting the government by crafting essential policies, strategies, and plans necessary to fully integrate RE into Nepal's mainstream energy supply and to institutionalize EE across various sectors. Furthermore, AEPC has been pivotal in elevating climate change mitigation and adaptation to a prominent position on the national agenda.

AEPC has made significant contributions to the development and operationalization of several sectorial policy, strategy and plan documents, including:

- Periodic Plans (focusing on RE, EE and Climate Change)
- Rural Energy Policy, 2006
- Central Renewable Energy Fund Operation Manual, 2013 (First Amendment, 2021)
- Biomass Energy Strategy, 2017
- White Paper of Ministry of Energy, Water Resources and Irrigation, 2018
- National Energy Efficiency Strategy, 2018
- National Climate Change Policy, 2019
- Long Term Strategy for Net Zero Emissions, 2021
- Grid Connected Alternative Electricity Development Guideline, 2021
- Renewable Energy Subsidy Policy, 2022
- Renewable Energy Subsidy Delivery Mechanism, 2022
- National Renewable Energy Framework, 2022
- Renewable Energy and Energy Efficiency Bill, 2023
- Green Hydrogen Policy, 2024
- Energy Development Roadmap 2025
- Third Nationally Determined Contributions (NDC 3.0), 2025

2.5 CUMULATIVE ACHIEVEMENTS

AEPC has actively promoted the adoption of a wide range of RE technological solutions in both urban and rural settings. Across its 28 years of operation, the organization has provided support via subsidies, technical assistance, viability gap funding, and

credit financing to more than 14 million individuals nationwide for meeting their energy needs (note: some individuals may be counted multiple times depending on the number of RE technologies received). The cumulative quantity of RE technologies promoted by AEPC up to the end of Fiscal Year 2024/25 is outlined in the table below.

Table 1: Cumulative achievement in technology promotion

Program	Unit	Achievement Up to FY 2024/25
Micro/Mini Hydro	kW	40,655
Solar Mini grid Solar/Wind Min-grid System	kWp	3475
Solar Drinking Water and Irrigation Pump	Nos.	4,280
Institutional Solar PV System	Nos.	4,540
Solar Rooftop	kWp	30,939
Solar Home System	Nos.	1,000,789
Domestic Biogas	Nos.	456,766
Institutional, Urban and Commercial Biogas Plant	Nos.	378
Portable Metallic Stoves	Nos.	156,531
Induction Stove	Nos.	82,485
Solar installed at religious place and homestay	Nos.	4,865
Solar street lights	Nos.	3,309
Improved Water Mill (IWM)	Nos.	11,104
Mud Improved Cooking Stoves (ICS)*	Nos.	1,423,242
Institutional Gasifier	Nos.	33
Solar Dryer and cooker	Nos.	2,464
Productive End Use	Nos.	1,766

AEPC has consistently demonstrated its commitment to providing RETs and services in the country, successfully fostering partnerships with DPs. This dedication and the resulting achievements have earned the sector numerous accolades and honors. The market has grown significantly competitive, now featuring approximately 500 private companies that collectively generate both direct and indirect employment for over 40,000 individuals. This has given rise to a thriving RE market that has effectively permeated every corner of the country. AEPC's engagement with multilateral climate fund, such as GCF, will be instrumental in scaling clean cooking solutions to reach a million households across Nepal over the next five to six years. AEPC is also set to play a critical role in developing municipal waste-to-energy projects and distributed renewable energy (DRE) in the near future.





Energy Transition for Resilient and Low Carbon Economy Summit
2025 hosted by AEPC

PROGRAMS AND PROJECTS

AEPC undertakes various programs and projects, funded from GoN sources as well as jointly with GoN and DP sources. This section summarizes the diverse programs, projects, and specific initiatives implemented during the reporting period.

3.1 SPECIAL AND TARGETED RE AND EE PROGRAMME

During the reporting period, AEPC efficiently carried out RE development and EE promotion efforts using government funds. These include micro/mini hydropower, solar, bioenergy, and biogas to remote rural communities, with a specific focus on women, marginalized populations, and disadvantaged groups. Targeted initiatives ensured energy provision for essential community needs, such as smoke-free households, healthcare, education, irrigation, agriculture, and tourism. This work also included the development of biogas bottling facilities, the provision of RE services to religious institutions, schools, hospitals, and public organizations, and cross-cutting activities on EE promotion, productive energy utilization, capacity building, quality assurance, GESI, climate and carbon finance.

3.2 NATIONAL RURAL AND RENEWABLE ENERGY PROGRAM

The National Rural and Renewable Energy Program (NRREP) served as a comprehensive national initiative that united the efforts of the Government of Nepal (GoN) and development partners to promote RE in the country. Under NRREP, five governments,

two multilateral banks, and three intergovernmental organizations combined their resources, amounting to USD 171 million, for a five-year renewable energy promotion endeavor from 2012 to 2017.

The overarching goal of NRREP was to enhance the quality of life for rural men and women, boost employment opportunities for both genders, increase productivity, reduce reliance on traditional energy sources, and achieve sustainable development by integrating alternative energy into the socioeconomic activities of rural communities. NRREP aimed to reach rural populations through a diverse range of renewable energy technologies utilizing solar, hydro, and biomass resources.

Following the completion of NRREP in 2017, the GoN continued its commitment to developing the RE sector continuing NRREP with GoN as well as DP funding by introducing the National Renewable Energy Framework (NREF). This framework enables development partners and other organizations to collaborate with the government under a common vision to deliver renewable energy services through an integrated results framework. NREF's objectives encompass coordinating and monitoring the outcomes of various RE initiatives, engaging stakeholders, and facilitating the mobilization of financial resources. Moreover, mobilizing the VGF has been added to the mandate of CREF with the incorporation of SECF with CREF in 2021.

The GoN has sustained the NRREP allocating resources from GoN source as well as development partners' sources. Additionally, CREF, established as a financial intermediary mechanism to mobilize subsidies, VGF and credits for sustainable energy solutions through a network of banks and financial institutions, continues to provide financing guided by the operation manual.

3.3 MAJOR PROGRAMS/PROJECTS IMPLEMENTED UNDER NRREP

3.1 South Asia Sub-regional Economic Cooperation

The South Asia Sub-regional Economic Cooperation (SASEC) Power System Expansion Project, which is backed by the Asian Development Bank (ADB), aims to contribute to Nepal's energy development goals by significantly increasing both on-grid and off-grid RE supply. SASEC intends to help enhance rural livelihoods by providing access to clean energy. This project directly supports Sustainable Development Goals (SDG) 7 and 13 by ensuring access to affordable, reliable, sustainable and modern energy. Additionally, it contributes to increasing the share of RE in the national energy mix and contributes to other SDGs using energy as the entry point. The promotion of productive uses of electricity generated directly links to SDGs 1, 8, and 12, while the gender component of the project aligns with SDG 5. This project consists of two main components, with the on-grid component being executed by the Nepal Electricity Authority (NEA), and the off-grid component being implemented by AEPC. The off-grid component is designed to enhance access to RE sources, thereby improving the livelihoods of people and creating employment opportunities,

particularly in rural areas. This initiative aims to boost income and prosperity in rural communities, primarily within sectors such as rural enterprise, education, health, and agriculture. The project aligns with the ADB Country Partnership Strategy, which focuses on several key areas, including enhancing inclusive electricity access, promoting RE development, fostering regional cooperation, and strengthening sector governance.

For this project, there are provisions for financial support, including a \$5 million credit line from ADB's Special Funds, which is allocated to user communities and developers for mini-hydro power plants, and an \$11.2 million grant from the Strategic Climate Fund (SCF) administered by ADB. Additionally, the project aims to enhance overall capacity by implementing a capacity development program for AEPC. This includes providing project management support, assisting in the preparation of distribution system and rural electrification master plans, conducting feasibility studies for utility-level wind farms, and facilitating parallel livelihood development activities in the project area.

The off-grid component complements the NRREP initiatives related to community electrification. The project's targets include supporting the development of 4.3 MW mini-hydro power plants and 500 kW capacity solar or solar-wind hybrid projects.

3.3.2 Renewable Energy for Rural Livelihood Project

The Renewable Energy for Rural Livelihood (RERL), a joint project of United Nations Development Programme (UNDP) Nepal and AEPC, was initiated in 2011, after successful completion of Rural Energy

Development Programme (REDP). In 2014, Global Environment Facility (GEF) and UNDP supported GEF-RERL for 5 years with the total budget of USD 5 million, USD 3 million provided by GEF as part of its Climate Mitigation Portfolio and USD 2 million by UNDP. The project worked towards removal of technological, financial, institutional and regulatory barriers for large-scale deployment of renewable energy systems in Nepal. In this way, GEF-RERL played a pivotal role in various aspects, including the development of Municipal Energy Plans, development of technical and institutional guidelines, establishment of financial instruments such as Vendor Financing Mechanism, Vendor Challenge Fund and Credit Guarantee Mechanism at CREF to reduce risks for private investors, which have been crucial in achieving financial closure of ADB funded SASEC off-grid subprojects.

Since 2019, RERL with financial assistance from Asian Development Bank (ADB) and UNDP has been supporting AEPC to implement the SASEC subprojects – 4.8 MW of Mini Hydro Subprojects (MHP) and Solar and Solar Wind Hybrid Mini Grids (SMG). In the meantime, RERL with financial support of Government of Japan supported rehabilitation of MHPs, water lifting for both irrigation and drinking water, productive energy uses and institutional strengthening. These activities are also incorporated in UNDP's Renewable Energy for Resilient Agri-Food Systems (RERAS), energy component of which is also implemented by RERL.

3.3.3 Renewable Energy and Energy Efficiency Programme- Green Recovery and Empowerment with Energy in Nepal

The Deutsche Gesellschaft für

Internationale Zusammenarbeit (GIZ) GmbH is providing support for the Renewable Energy and Energy Efficiency Programme- Green Recovery and Empowerment with Energy in Nepal (REEEP-GREEN), which is a technical cooperation project established through agreement between the GoN and the Federal Republic of Germany as well as GoN and European Union (EU). With GIZ acting on behalf of the German Federal Ministry of Economic Cooperation and Development (BMZ) and EU, the execution of REEEP-GREEN falls under the responsibility of the MoEWRI. The primary goal of REEEP-GREEN is to enhance the conditions necessary for planning and implementing energy-efficient measures in Nepal. This program aims to support in establishing the regulatory, institutional, and private-sector frameworks for the widespread adoption of RE and improvements in EE. REEEP-GREEN adopts a multi-level approach comprising five key components: Output 1 focuses on creating a policy, institutional, and regulatory framework for RE and EE at the national level; Output 2 deals with establishing institutional frameworks for RE and EE at subnational levels; Output 3 centers on promoting sustainable market development for RE and EE; Output 4 concentrates on disseminating results and knowledge in the field of RE and EE and Output 5 focuses on EE in industries and enterprises. REEEP-GREEN is also providing technical and financial assistance for the project implementation under SECF.

3.3.4 Micro Hydro Debt Fund

The Micro Hydro Debt Fund (MHDF) was created with the assistance of Energizing Development (EnDEV) programme of GIZ and was designed specifically for lending to Micro Hydropower Projects

(MHPs). It was initially established with a total of Euro 500,000, and later this amount was increased by an additional Euro 42,000. The primary aim of this fund is to enhance access to clean energy solutions for rural communities by offering credit support to off-grid MHPs. The fund's resources are managed and distributed through two banks: the Himalayan Bank and the NMB Bank.

3.3.5 Biogas Credit Fund

The Biogas Credit Fund was established in the year 2000, with support from the Federal Republic of Germany through KFW, and in partnership with the Government of Nepal. The primary goal of this fund is to provide financing through intermediary wholesale lending organizations, such as non-government organizations (NGOs), saving and credit cooperatives (SACCOs), and rural development banks (RDBs). These intermediaries then grant the sub-loans to farmers who are unable to cover the full cost of a biogas plant with their own funds. Government of Nepal has received NPR 234.338 Million as a grant from KFW, which was given by MoF to AEPC as credit and AEPC has already paid back NPR 195.115 Million to Public Debt Management Office (PDMO).

Presently, over 348 LFIs/MFIs are actively involved in facilitating the mobilization of credit to biogas users.

3.3.6 Nepal Renewable Energy Program

Nepal Renewable Energy Program (NREP) is a program started on 2017 is going to be completed by March 2026 with a total budget of £9.2 million, funded by UKAid as part of the Climate Smart Development for Nepal initiative. Out of the total UKAid funding of 18 M GBP, external service provider manages the 9.2 M GBP and the rest

8.8 M GBP is channeled through CREF of AEPC as a VGF. This program was implemented by AEPC with support from external service provider DAI Europe and Winrock International consortium selected by British Embassy Kathmandu (BEK). NREP was designed to accomplish several objectives:

1. Enhance the capacity of the Government of Nepal to lead and manage the National Renewable Energy Framework (NREF), with AEPC as the primary point of contact, but with potential involvement from other relevant institutions such as AEPC, MoEWRI, the provincial level ministries looking after energy portfolio, Nepal Electricity Authority (NEA), and more.
2. Strengthen the capacity of the CREF to effectively manage and allocate climate finance.
3. Directly engage in program activities related to creating demand for RE, ensuring the supply of RE technologies, and providing financial support for RE initiatives.
4. Generate and share knowledge and research pertaining to Nepal's RE sector. This includes developing networks of partners involved in the sector and facilitating the exchange of knowledge and learning.

Independent economic modelling confirms that NREP delivered real and lasting gains for the economy, jobs, and local resilience. During implementation, the programme added an average of USD 3.22 million to Nepal's GDP each year and supported around 91 full-time equivalent jobs annually. From 2025 onwards, as more businesses and households make use of clean

energy, that annual GDP impact is expected to grow to USD 6.03 million, supporting about 576 jobs each year. This projection is based on modelling that assumes continued operation of NREP-supported systems, expansion of productive energy use in rural enterprises, and steady growth in clean energy adoption rates observed during 2023–24. For every dollar spent during the programme, Nepal gained nearly twice that in economic value. Over the expected 20-year lifespan of the renewable energy systems deployed, the return is projected to increase to 11 to 1. These figures are conservative, they reflect only formal economic impacts and don't include the value of avoided emissions, improved household wellbeing, or strengthened institutions.

3.3.7 Nepal Private Sector-Led Mini Grid Energy Access Project

To enhance and sustain the off-grid electricity supply model, it has been recognized as necessary to promote a privately led approach with private sector management and funding. Consequently, the GoN has entered into an agreement with the World Bank to execute the "Nepal: Private Sector-Led Mini Grid Energy Access Project (MGEAP)" with the primary goal of increasing electricity generation through renewable energy mini-grids (such as Solar, Wind, Solar/Wind Hybrid, and Micro/Mini Hydro) in specific regions by engaging Energy Service Companies (ESCOs).

Renewable energy mini-grid initiatives eligible for participation in the (MGEAP) encompass the following categories:

1. Greenfield mini-grid initiatives: These encompass subprojects with a total capacity of 2.8 MW.
2. Upgradation of mini-grid initiatives: These involve subprojects with a

cumulative capacity of 0.5 MW and Grid interconnection of mini-grid initiatives: These include subprojects with a cumulative capacity of 0.5 MW.

From June 2022, remaining activities of then Scaling up Renewable Energy Programme (SREP)-Extended Biogas Project have also been consolidated in to MGEAP.

3.3.8 Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal

AEPC is executing a project "Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal (AEPC/KFW-DKTI Solar Project)" with financial assistance from the Federal Government of Germany through KFW Development Bank. The main objective of the project is to increase the supply of solar electricity and reduce CO2 emissions through investments in on-grid (solar rooftop systems) and off-grid (solar irrigation pumps and solar mini-grids) Photovoltaic (PV) systems. Grant Support for the project from the Federal Government of Germany through KFW Development Bank is 9 Million Euro.

The project was started from March 2023, and will be completing by September 2026. There are three target components of the project i.e. On-grid component which includes Solar Rooftop systems (SRT) with 30 MW target, and pilot solar projects at 4 hospitals (540 kWp). Off-grid component which includes Solar Irrigation Pump (SIP) with 155 nos. (600 kWp) target, 10 Solar Mini-grid Project (523 kWp) and Capacity Building activities.

3.3.9 Promotion of Solar Technology for Economic Development

The Promotion of Solar Technologies

for Economic Development (POSTED) project was funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and jointly implemented by AEPC and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The project aimed to accelerate the adoption of solar photovoltaic (PV) technology across Nepal by improving the regulatory framework, strengthening the capacities of both public and private stakeholders, and establishing systems for performance and environmental monitoring.

Launched in 2022 and completed in December 2024, the POSTED project supported the provincial governments of Koshi, Sudurpaschim, and Karnali. In cooperation with KfW, the project focused on empowering local governments and private companies to scale up the adoption of Solar Mini-Grids, Solar Water Pumping, and Solar Rooftop systems. To support this goal, dedicated tools and instruments were developed to strengthen the capacity of local governments in planning and implementing these solar PV technologies

3.3.10 Green Climate Fund

Green Climate Fund (GCF) is the Financial Mechanism within UNFCCC, established by the COP 16- Cancun to help developing countries to invest in low carbon resilient development. It acts as operating entity for implementing Paris Agreement. It is a critical element of the historic Paris Agreement and is the world's largest climate fund, mandated to support developing countries raise and realize their Nationally Determined Contributions (NDC) ambitions towards low-emissions, climate-resilient pathways.

AEPC initiated the accreditation process in March, 2017 with the application submitted for the accreditation process. The 22nd Board meeting of GCF's Board (B.22) on 28th February 2019 approved AEPC's accreditation to the GCF under Project Size Category: Small (up to 50 million USD) and Fiduciary Standard: Basic Project Management.

GCF has approved the Mitigating GHG emission through modern, efficient and climate friendly clean cooking solutions (CCS) project and there are several project pipelines in place. These includes (i) Increasing community resilience through enhancement of equitable access to green agriculture; (ii) Sustainable, climate resilient and community based micro hydropower social enterprises for the rural mountains of Nepal; (iii) Improvement of energy efficiency in industrial enterprises for climate change mitigation; (iv) Enhancing energy access by generating energy from the waste for mitigating climate change; (v) Community based solar drinking water for enhanced livelihood and climate resilience; (vi) National distributed renewable energy programme; (vii) Building energy efficient cities; (viii) Powering health and education for enhancing the access to energy and adapting to climate change; (ix) Improvement of quality and reliability of the renewable energy solution for mitigation and adaptation to climate change; (x) Climate neutral village; (xi) Green hydrogen project; (xii) Transformation of the bricks industry in Nepal towards eco-friendly bricks production

3.3.10.1 Mitigating Greenhouse Gas Emissions through Modern, Efficient and Climate-friendly Clean Cooking Solutions

Nepal's Terai region, the project was

approved with the total budget of USD 49.2 million that includes USD 21.12 million grant from the GCF, USD 20.95 million co-financing from the GoN and USD 7.06 million co-financing from the Local Levels. Activities will include scaling up the deployment of clean cooking technologies through accelerated investment and market development, as well as installing 500,000 Electric Stoves, 490,000 Tier 3+ ICS and 10,000-biogas plants while reducing 6.5 million tCO₂eq

In terms of the GCF results area, the project aims to reduce emissions from buildings, cities, industries and household appliances. In addition, the project will support improving the health and well-being of the most vulnerable people and communities of the target region.

Comprehensive groundwork has been completed, including the establishment of the Project Implementation Unit (PIU) at the central level and Provincial Project Management Units (PPMUs) across clusters. Recruitment of central and field-level human resources have been finalized with a deliberate emphasis on gender balance and inclusion of indigenous representatives. Core management, coordination, and reporting systems are operationalized to ensure efficient project execution and accountability.

The project has made significant strides in both implementation and strategic alignment. Regular coordination meetings have been held with all key stakeholders, including co-financiers and private sector partners, and the project has hosted two missions from the GCF (a review mission and an IEU visit) to ensure oversight and coherence.

Collaboration with local levels has been highly successful, resulting in 137 signed

Memorandums of Understanding (MOUs) and the collection of preliminary demand for approximately 800,000 clean cooking technologies. In terms of technology deployment, procurement for 100,000 CCS units has been completed, and 32,000 units have been delivered to respective local levels, with ongoing coordination ensuring timely co-financing.

To strengthen the enabling environment, existing standards have been updated, a feasibility study on cost-effective electric cooking tariffs for the Terai region has been completed, and a national Management Information System (MIS) has been developed for supply and demand tracking. Furthermore, institutional capacity has been enhanced at the sub-national level, with 54 Municipal Energy Plans (MEPs) finalized and 11 awareness and outreach programs conducted to promote the adoption and benefits of the Clean Cooking Solutions.

3.3.10.2 GCF Readiness and Preparatory Support Program

The GCF Readiness and Preparatory Support Programme (RPSP), titled "Readiness Support for Enhancing the Capacity of the National Designated Authority (NDA) and Other Stakeholders for Project Pipeline Development in Nepal," was implemented by AEPC as the delivery partner to the NDA (Ministry of Finance). Operational from July 2022 to April 2025, the RPSP successfully addressed three core objectives: capacity building, strategic framework development, and paradigm-shifting pipeline development. Key achievements included the finalization and endorsement of Nepal's Country Programme, comprehensive capacity building for the NDA and Direct Access Entities (DAEs), support on the accreditation process and project

pipeline development. RPSP also supported the drafting of a Climate Finance Access and Mobilization Guideline and the preparation process of the NDC 3.0.

3.3.11 ICIMOD

The strategic partnership between AEPC and ICIMOD has advanced renewable energy deployment in Nepal through policy advocacy, capacity building, and knowledge sharing aimed at driving economic growth and climate resilience. A key outcome is the PURE Decision Support Platform, which enables rapid, evidence-based planning and pre-feasibility assessments for renewable energy-powered lift irrigation systems. Their joint capacity-building initiatives trained 361 engineers and officials, while orientation programs across six provinces helped standardize planning and implementation processes. Together, they also developed Nepal's Solar Thermal Roadmap and Implementation Plan, targeting 6,500 MWth by 2045 and informing national climate commitments, alongside the creation of solar thermal standards. Additionally, regional knowledge exchange among countries such as Bangladesh, Bhutan, China, and Pakistan has strengthened cross-border

collaboration on renewable energy for mountain regions.

3.3.12 Other Collaborative Partners

AEPC maintains active and extensive collaborative partnerships with a wide range of international and national organizations to promote RE, EE, and climate/carbon financing in Nepal. It has been actively collaborating with organizations such as FAO, IRENA, IWMI, GGGI, IUCN, SNV, UNICEF, WWF, Practical Action, Renewable World, WePOWER, BEEN, CRT/N, Wine to Water and the Clean Cooking Alliance, among others. These partnerships drive initiatives focused on implementing innovative interventions to enhance access to clean energy, optimize energy use, and reduce carbon emissions. Through these joint efforts, AEPC and its partners are working to strengthen Nepal's energy infrastructure, improve resilience to climate change, and actively facilitate carbon financing mechanisms to mobilize resources for cleaner energy projects, thereby contributing to the global sustainable energy transition and fostering broader regional cooperation





Solar Irrigation Pump at Susta Rural Municipality, Nawalparasi

PROGRESS OVERVIEW

During the fiscal year 2024/25, AEPC implemented its RE and EE initiatives through two distinct funding approaches: first, a targeted RE and EE program managed directly under the AEPC name and funded exclusively by the GoN; and second, the National Rural and Renewable Energy Program (NRREP), which was jointly financed by the GoN and other DPs.

For the 2024/25 reporting period, the GoN-only AEPC program achieved strong results, meeting 94% of its physical goals and 81% of its financial targets. Meanwhile, NRREP reported substantially lower progress, completing only 55% of its physical targets and meeting 54% of its financial targets. The primary obstacle was insufficient budget, exacerbated by issues in securing expected funds. Specifically, counterpart funding from Local Governments (LGs) proved to be one of the main challenges, hindering timely project execution at the municipal level. Furthermore, external factors contributed significantly including disruptions due to unprecedented adverse weather events in mountainous regions, impacting construction and delivery schedules. Finally, challenges related to loan management also contributed to the delay in achieving planned financial milestones.

Table 2: Annual progress of AEPC implemented programs

SN	Programs	Progress	%
2024/25			
1	AEPC	Physical	94 %
		Financial	81 %
2	NRREP	Physical	55%
		Financial	54%

4.1 ALLOCATION AND DISURSEMENTS

In the evaluation period, AEPC carried out its initiatives via two avenues:

specific and focused programs known as AEPC and NRREP. In the fiscal year 2024/25, GoN allocated approximately 41% of the total budget for program implementation through these two channels, namely the targeted RE and EE Program and NRREP. The remaining funding was secured through international funding comprising 57% in the form of grants and 2% as loans.

In the fiscal year 2024/25, AEPC's total budget for both program routes was NPR 2,394 million, leading to an overall financial achievement of 60% with NPR 1,429 million disbursed. Specifically, the financial progress for the targeted RE and EE program funded solely by the GoN remained strong at 81%. However, progress under the NRREP reached only 54%, primarily due to co-financing constraints and operational delays caused by external factors beyond AEPC's direct control, despite the best efforts to mitigate these challenges.

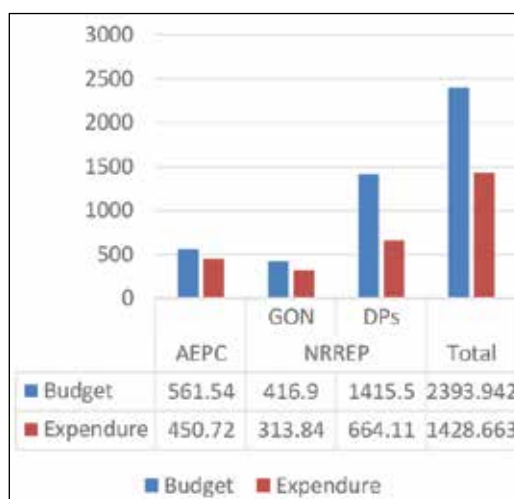


Figure 4: Budget allocated and the progress (in million NPR) (FY 2024/25)

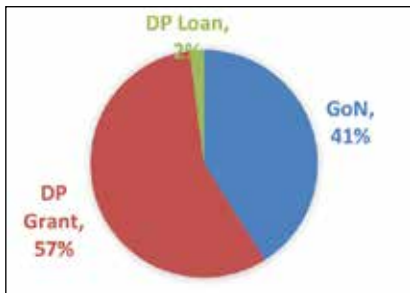


Figure 5: GoN allocation, Foreign Grant and Loan in total RE budget in 2024/25

4.2 PHYSICAL PROGRESS

The details of the progress made in terms of physical accomplishments during the specified time frame are provided in section 4.2. A comprehensive breakdown of the physical progress achieved in the reporting period can be found in annexes 1 and 2. It's worth noting that fieldwork encountered certain hindrances owing to geographical difficulties and natural disasters.

4.2.1 Mini & Micro Hydro and IWM Related Activities

The core program focused heavily on rehabilitation and efficiency, successfully completing the repair of 7 micro hydro projects and exceeding its target for the improvement and reconstruction of CDM-registered micro/mini hydro and improved water mills (9 achieved against 8 targeted, 112% achievement). Furthermore, 6 out of 7 incomplete and sick micro hydro projects were successfully completed (86% achievement), and three micro hydro-operated lift irrigation systems were installed under productive energy use.

Under the NRREP, the program was highly successful in oversight and technical support, achieving 100% of its goals for both third-party monitoring and technical assistance

for SASEC projects. The component for Electrification through pico, micro and mini hydro projects significantly exceeded its target by reaching 201% (402 kW achieved against a 200 kW target).



Figure 6: Progress of key mini/micro hydro related activities



Figure 7: Jhumsa Khola III Grid Interconnected Micro Hydro Project (68 kW), Mathagadhi Rural Municipality, Palpa



Figure 8: Control room of the Jhumsa Khola III Grid Interconnected Micro Hydro Project

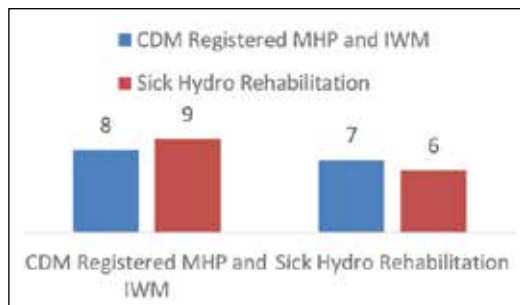


Figure 9: Progress of CDM registered and sick/incomplete MHPs and IWMs

4.2.2 Solar Energy Related Activities

Solar energy initiatives demonstrated high achievement across most categories, with key successes in both the GoN-funded core program and the NRREP. Under the AEPC Core Program, the agency successfully met its targets for technical planning, completing the Detail Feasibility Study of Solar Mini Grid Projects (10 out of 10 targeted). Deployment goals were exceeded, with Solar Pumps for Irrigation reaching 200 units (vs. 172 targeted), and Solar Home System installations in community/religious places reaching 107 units (vs. 100 targeted). The target for electricity generation from mini grid projects achieved 378kW against a 400kW target.

The NRREP component achieved notable success in large-scale system deployment: Institutional Solar and Solar Rooftop System Installation significantly exceeded its target by 185%, achieving 5,925 kW against a 3,200-kW goal. The program also successfully completed all SECF targets (20 out of 20 achieved). However, some household and pumping targets fell short: Solar Home System installations for un-electrified areas reached 4,142 units (vs. 5,000 targeted), and Solar Water Pumping for Irrigation and Drinking water reached 57 units (vs. 200 targeted). Activities related to DKTI (solar energy promotion) achieved half

of their goal (5 out of 10 targeted). Another highlight in the fiscal year is grid interconnection of the 100kW Susta SMG, Nawalparasi. Further, AEPC and NEA signed a generic agreement to promote grid interconnection of solar PV projects as the grid reaches their service areas.

The Nepal Photovoltaic Quality Assurance (NEPQA) standard, originally introduced in December 2000 as the Nepal Interim Photovoltaic Quality Assurance (NIPQA) by AEPC to ensure quality in Solar Home Systems, has undergone multiple revisions as per the advancement of solar PV technologies nationally and globally. It was revised in 2002, 2005, 2009, 2013, and 2015, and the current sixth revision is titled Nepal Photovoltaic Quality Assurance-2025 (NEPQA-2025) has been published and applicable since 8th October 2025.

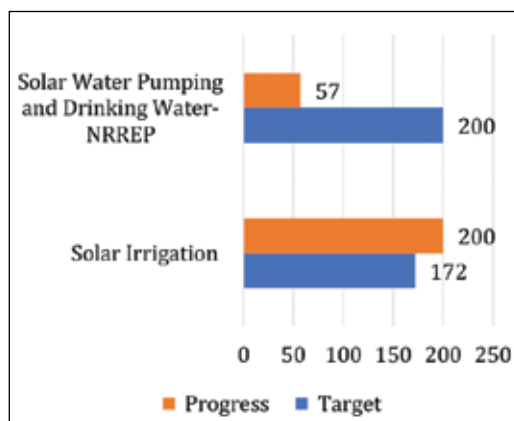


Figure 10: Progress of Solar Water Pumping System



Figure 11: Solar Rooftop installed with support from AEPC/KFW-DKTI Solar Project

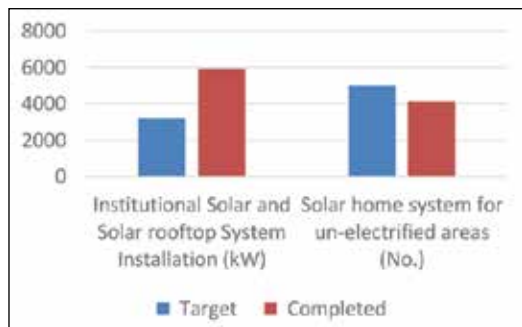


Figure 12: Progress of ISPS and SHS

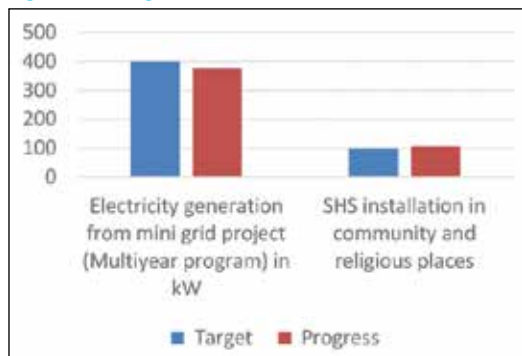


Figure 13: Progress of Mini Grid and Community Systems



Figure 14: Figure 15: grid integration of solar mini-grid system (100 kWp) in Susta-5 Nawalparasi

4.2.3 Bioenergy

The Bioenergy sector showed strong performance in replacing traditional cooking fuels but saw some shortfalls in institutional and GCF-related targets. Under the AEPC Clean Energy Program, the initiative to replace dung cakes and agricultural residue for cooking exceeded its goal, achieving 15,100 replacements against a target of 15,000.

Under the NRREP, Clean Cooking Solutions Project Implementation, the installation of Household Biogas reached 4,386 units against 5,000 units target, and Community and Institutional Biogas Plants reached 9 out of 10 targeted units. Technical and capacity development targets fell slightly short, achieving 3 out of 5 planned activities. Similarly, under the CCS project, 32,000 Clean cooking technologies have been distributed to the households of Terai region.

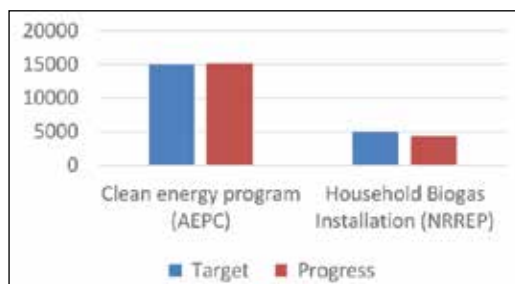


Figure 16: Progress of biogas technology



Figure 17: Domestic Biogas Plant installation

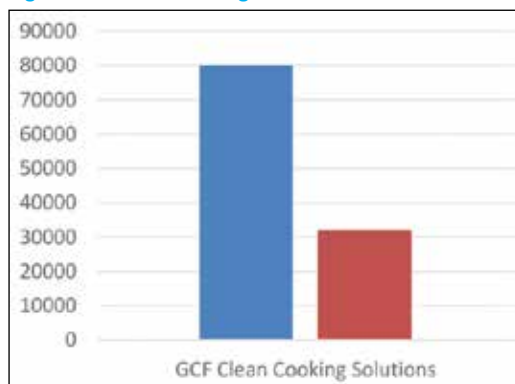


Figure 18: GCF Clean Cooking Solutions Programme



Figure 19: Tier 3 Stove installation with support from AEPC



Figure 20: Electric Cookstove installation with support from AEPC

4.2.4 Energy Efficiency

The Energy Efficiency sector achieved 100% of its targets under the AEPC program, successfully providing Support in energy efficiency to public and private institutions (2 targeted and 2 achieved).



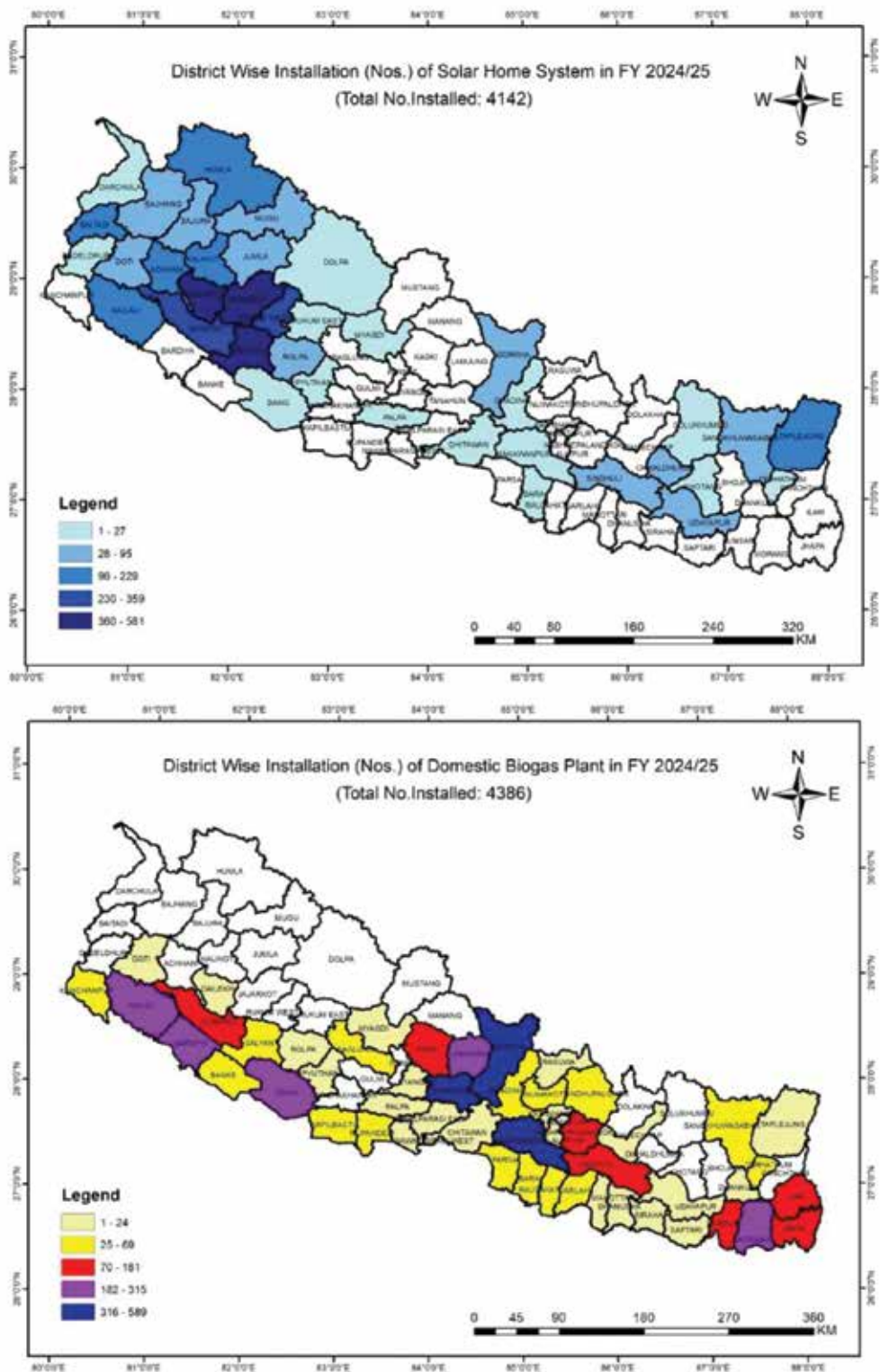
Figure 21: Energy Manager Training conducted by AEPC

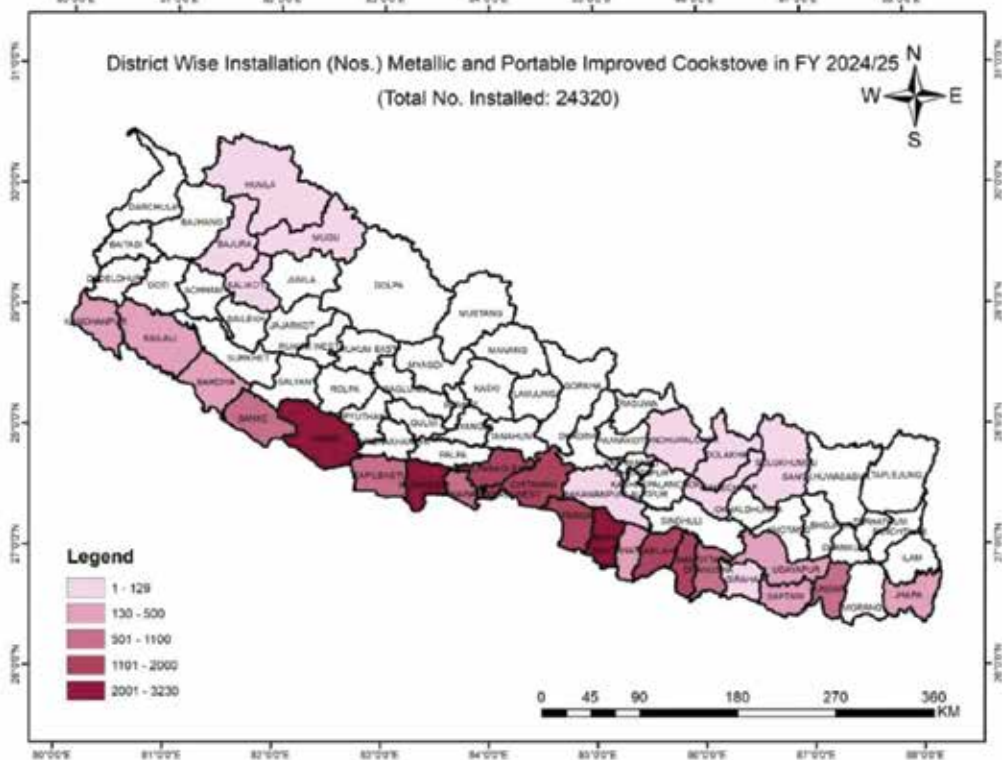
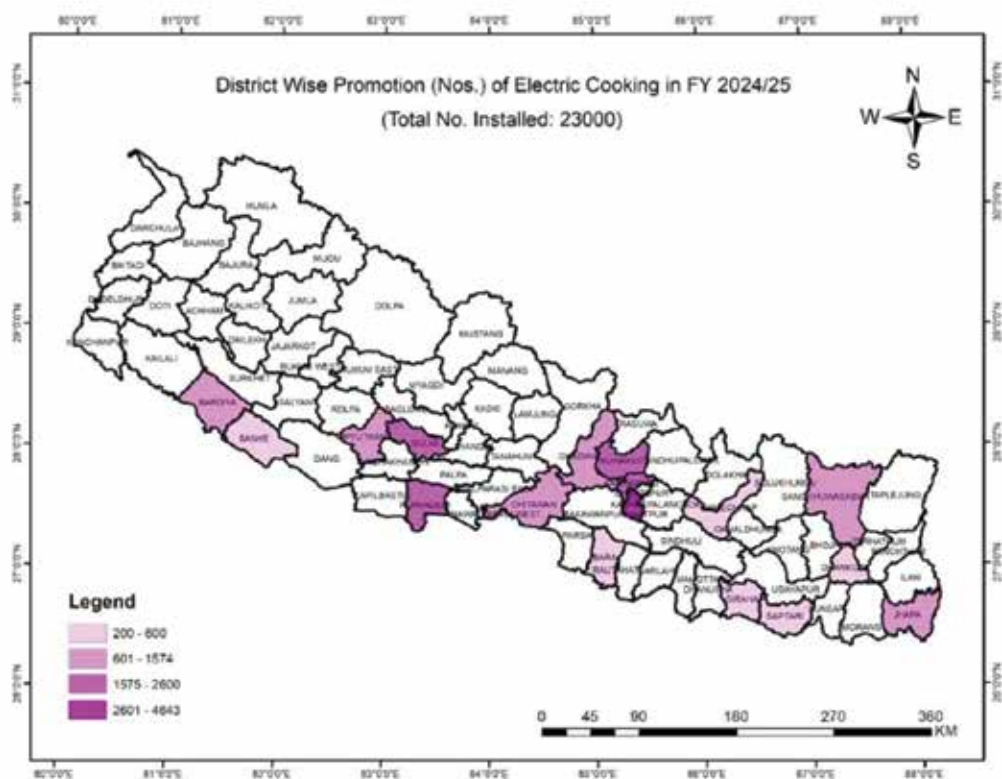
4.2.5 Outreach Management

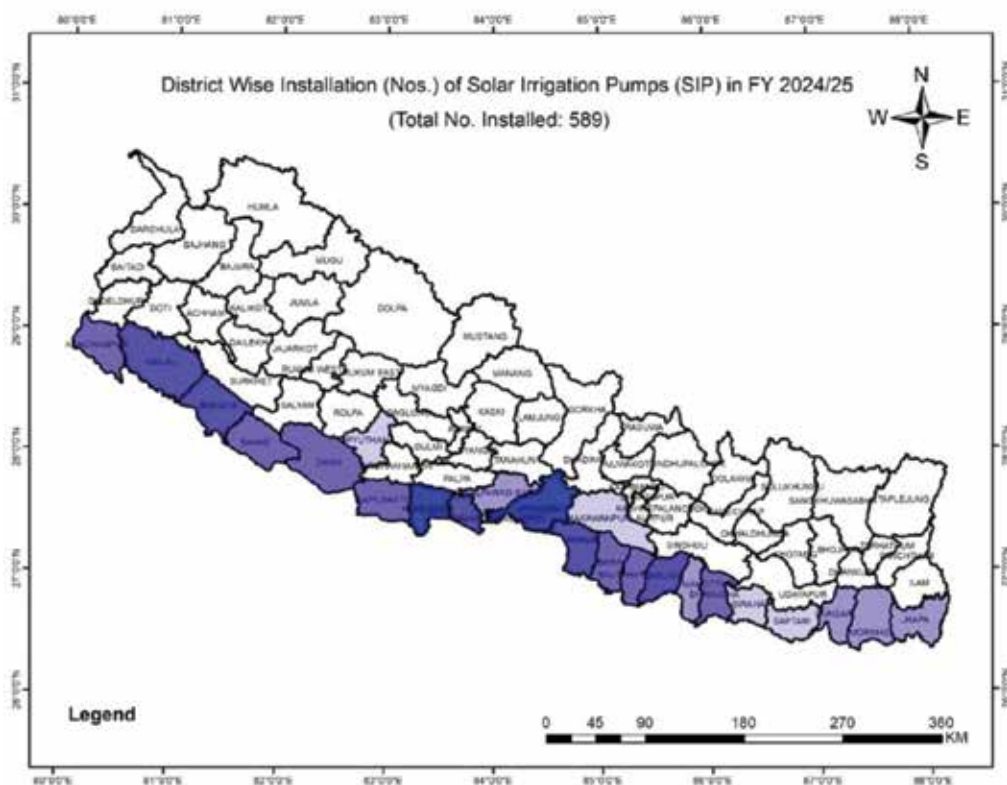
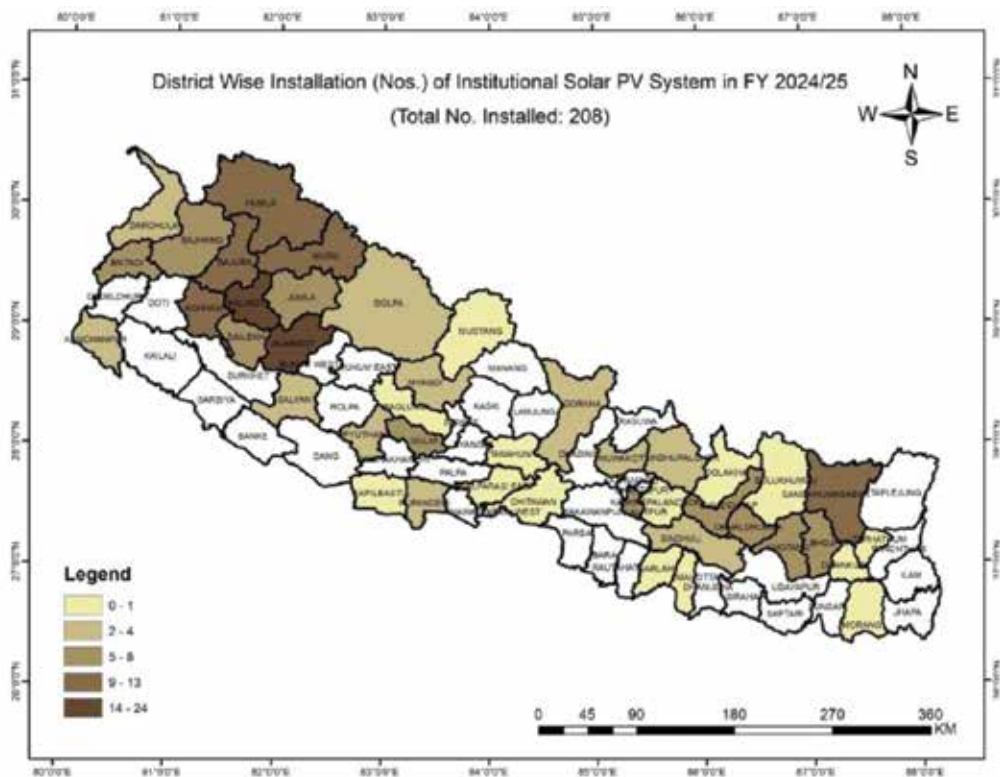
The Outreach and Capacity Building target of providing orientation to local level, provincial level, and stakeholders on RE was fully achieved by AEPC. This core work was substantially amplified by the GCF RPSP, which focused on capacity building, strategic framework development, and pipeline development. The RPSP successfully strengthened the strategic framework by finalizing Nepal's Country Programme to the GCF and supporting the preparation of the NDC 3.0. It delivered comprehensive capacity building through numerous workshops for DAEs, assisting in their accreditation process, and supporting the development of four GCF Concept Notes. Furthermore, the program held extensive workshops for the NDA and a wide range of country stakeholders, including the private sector and civil society. These efforts collectively enhanced institutional capacity, strengthened the climate finance pipeline, and supported the drafting of a Climate Finance Access and Mobilization Guideline, providing a robust foundation for Nepal's future climate finance engagement.

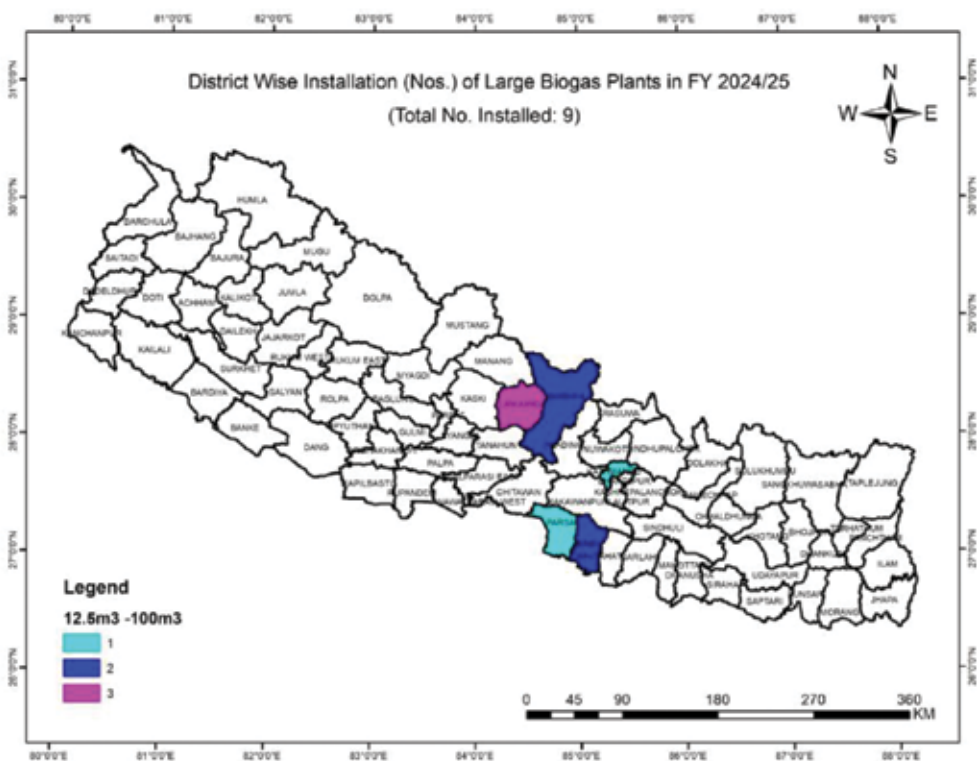
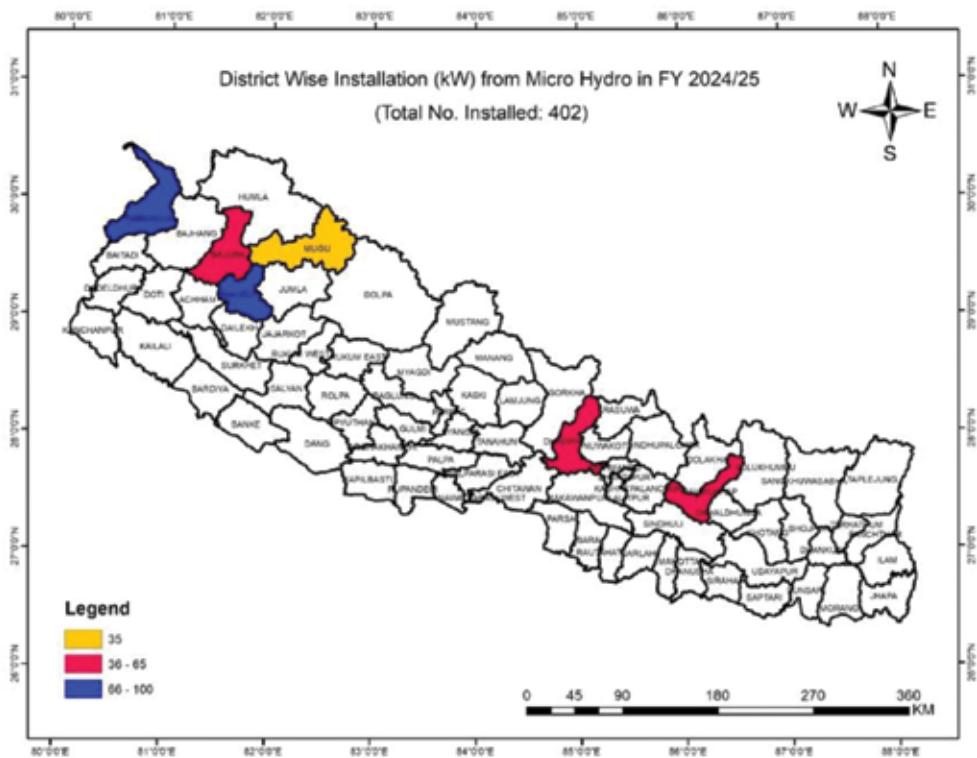


4.3 DISTRICT WISE GIS MAPS OF RENEWABLE ENERGY TECHNOLOGIES











28th AEPC Day Celebration

PROGRESS OF CROSS CUTTING ACTIVITIES

5.1 CARBON FINANCING ACTIVITIES

AEPC holds the distinction of being the pioneer government organization for carbon finance in Nepal, initiating this work by registering the country's first two projects under the CDM immediately after the Kyoto Protocol's enforcement. This focus was institutionalized with the creation of the Climate and Carbon Unit (CCU) in 2010. Following a 2020 Board decision, the CCU was upgraded to the Climate and Carbon Section (CCS) to enhance the coordination of AEPC's internal climate change-related efforts. Today, the CCS plays a crucial role in coordinating carbon financing, accessing international climate funds, and spearheading both climate change mitigation and adaptation initiatives within AEPC.

In response to the invitation for expressions of interest from Ministry of Finance, the National Designated Authority (NDA) of Nepal to the GCF, AEPC submitted its application to MoF to be the Direct Access Entity (DAE) of the Green Climate Fund (GCF). During the 22nd GCF Board meeting, AEPC was accredited as DAE to the GCF on 28 February 2019. This enabled AEPC to directly engage in projects with low to moderate environmental risks, supported by the GCF, with a total value up to 50 million USD. The accreditation to the GCF has presented significant opportunities for both AEPC and the nation.

- The opportunity to directly secure climate finance.

- Simplified access to climate funding for implementing organizations.
- Additional financial resources to close the funding gap.
- Strengthening institutional capabilities and fostering trust with global development collaborators.
- The potential to access other international sources of funding.
- Establishing trust among donor agencies and the private sector.
- Addressing the country's requirements for climate change adaptation and mitigation by leveraging financial resources from international, public, and private sources.

A significant milestone has been reached through AEPC's accreditation as the DAE by the GCF and the approval of the funding proposal on Clean Cooking Solutions and AEPC's role as the delivery partner of the Ministry of Finance to implement the GCF RPSP

5.1.1 Carbon Projects

AEPC holds eight CDM projects and program of activities (PoA), of which five biogas projects are in Gold Standard (GS) Registry also, which contribute as its regular source of revenue. Till date, around 6.79 million units of Emission Reduction (ER) has been generated and around 6.68 million units of ERs have been sold. The total earning from carbon revenue is around 36.011 million USD from Household Biogas, Improved Water Mill projects and Micro-hydro projects.

In accordance with the agreement of the Executive Board of the CDM (the Board) at its 118th meeting, the submission window for CDM registry is closed on 30th June 2023. All the CDM projects are now requested for the transition to Article 6.4 mechanism under Paris Agreement. All the eight CDM projects have received the host approval on 14th July 2025 from the GoN, MoFE and are listed in the UNFCCC List of CDM Activities in transition.

The biogas projects which are registered under gold standard registry are being verified for the issuance of Emission Reduction. The performance review for the verification of GS biogas project of fiscal year 2022/2023 of Biogas Programme of Activities 6, 7, 8, 9 and 10 is at final stage of review from GS Registry whereas verification of Program of Activities CPA 1 to 5 under programme of activities and Biogas Project Activity 3 and Project Activity 4 of Fiscal Year 2022/23 are completed and Biogas PoA Fiscal Year 2023/24 is under Verification from VVB (estimated to generate 0.59 million Emission Reduction), Biogas Project Activities 3 and 4 Fiscal Year 2023/24 is under final stage of review from Gold Standard Registry (estimated to generate 0.13 million Emission reductions) whereas Micro Hydro Projects and Improved Water Mill projects will be continued after the completion of transition process from CDM to Article 6.4 mechanism.

Development of Large Size Biogas as Carbon Programme in Nepal is proposed for Internationally Traded Mitigation Outcome (ITMO) under article 6.2 of Paris Agreement. The Draft version of Programme of Activities Design Document is prepared for the article 6.2 of Paris Agreement with the support from GGGI. This project is

waiting for the approval from MoFE, to move ahead. In terms of new voluntary carbon project, 10,478 fuel efficient tier 3 cookstoves were distributed in six (6) local governments of Karnali and Sudurpaschim Province under joint financial contribution of UNICEF Nepal, respective local government and individual households under the Ecozone project. AEPC signed MoU with respective local government for trading of emission reduction achieved by improved cookstoves. Under the name 'Ecozone Improved Cooking Stove Project in Nepal', AEPC has registered the project in VERRA registry and the final validation report is received from the Validation Verification Body. We anticipate an average of 44,044 tons of CO₂ equivalent emissions reduction annually from this project.



Figure 22: Any Photo on Carbon Related activities

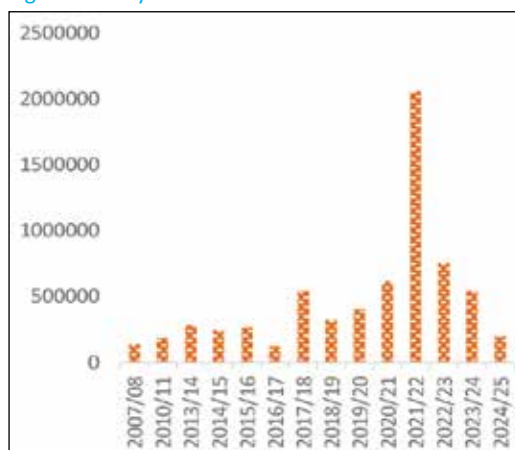


Figure 23: Year wise issuance of ERs(CERs and VERs)

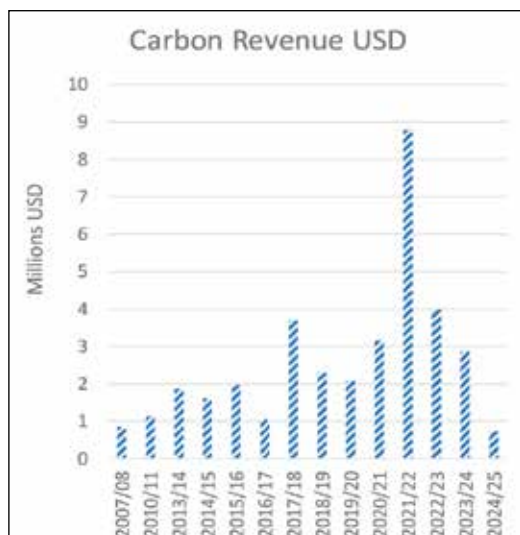


Figure 24: Year wise carbon revenue earning

5.1.2 CDM Audits

Verification and Validation audit of the Biogas Project Activities and Nepal Biogas Support programme-PoA was initiated in the reporting periods. Field verification was completed in the reporting period by Validation and Verification Bodies (VVBs). The Crediting Period Renewal of Biogas CPA 8 is completed by the VVB and submitted to GS Registry by VVB. The validation of Renewal of Crediting Period of Biogas PoA, VPA 1, VPA 9 and Project Activity 3 and Project Activity 4 is ongoing.

5.2 GENDER EQUALITY AND SOCIAL INCLUSION

The Gender Equality and Social Inclusion (GESI) Section at AEPC spearheads the integration of GESI activities across all technologies, with a strong focus on boosting the utilization of RE systems in off-grid areas. These wide-ranging efforts are designed to empower women and marginalized groups through several key initiatives: conducting training that enables women to participate in the construction and operation of mini-grid systems and serve as customer service

providers; actively working to augment the involvement of women and marginalized groups directly in project development; establishing micro-enterprises led by women; and offering specialized training programs in GESI-based community participation and the management of energy systems.

5.3 ENVIRONMENT AND SOCIAL SAFEGUARDS

A dedicated Environment and Social Safeguard Section has been created within AEPC to ensure the efficient implementation of the organization's adopted Environmental and Social Safeguard (ESS) Policy. This section is staffed to harmonize and standardize ESS measures across all technologies that AEPC endorses and supports. ESS matters are addressed on a per-project basis, as required by the specific project documents and in full accordance with Nepal's Environment Protection Act and Environment Protection Rules.

5.4 COMPLIANCE RELATED ACTIVITIES

In order to enhance internal control, internal auditing, and address compliance matters, the Compliance Unit has been operating effectively since its inception. The Compliance and Ethics Sub-Committee led by board member of AEPC has been overseeing matters pertaining to internal control and risk management system, financial reporting, and code of ethics.

5.5 MONITORING AND QUALITY ASSURANCE

Monitoring and ensuring the quality of program and project implementation are fundamental aspects of AEPC's work portfolio. Numerous monitoring and quality assurance activities were carried out in the reporting period. These activities primarily involved

external firms referred to as third-party monitors who are engaged as per the provisions of RE subsidy delivery mechanism. The MQA section organized training for power output and household verification inspectors, as well as an orientation training program for third-party monitoring consultants.

5.6 TRAINING AND CAPACITYBUILDING

AEPC continued the capacity development activities of its partner organizations, users groups, and other sectoral actors during the reporting period. Various training sessions were conducted on RE and EE technologies, climate finance, and technical support to the provincial and local levels, among others.

AEPC marked the United Nations' International Day of Clean Energy (January 26, starting from 2024) by spearheading the organization of a major national event in collaboration with various energy sector partners. This celebration was expanded into an "Energy Week" of coordinated events: Stakeholders Meet & Celebration of

International Clean Energy Day on January 26, 2025, and a subsequent Energy Transition for Resilient and Low Carbon Economy Summit 2025 on January 28, 2025. The week also included a Development Partners' Meet for Collaborative Support on Just Energy Transition on February 3, 2025, demonstrating AEPC's commitment to promoting a just and inclusive clean energy transformation through the presence of both national and international partners.

In addition, AEPC as the Delivery Partner of the Ministry of Finance to implement the GCF readiness and preparatory support programme conducted more than fifty capacity development workshops targeting different stakeholders including federal Ministries, Provincial Ministries, Local Governments, Direct Access Entities to the GCF, Civil Society Organizations, Private Sectors and Indigenous Communities and other stakeholders in the area of climate change and climate financing.





Solar Minigrid Project (120 kWp) installed at Soru Rural Municipality, Mugu

RENEWABLE ENERGY RESULT AREAS

6.1 ACCESS TO CLEAN ENERGY

RE promotion has been crucial in delivering clean energy access across Nepal, benefiting a cumulative number of 3.65 million households to date. This access breaks down into two main areas: approximately 1.5 million households gained electricity access through the installation of over 90 MW via mini/micro-hydro and solar initiatives (which power essential services like health and education and lift water for irrigation), and 2.15 million households received clean cooking solutions (Improved Cookstoves (ICS/MICS), biogas, and electric cookstoves). Collectively, these initiatives have created 40,000 jobs within the sector. In addition, RE has played a very important role in powering health, education, local government services, businesses, enterprises and agriculture.

AEPC's diverse deployment of RETs during the reporting period yielded significant benefits. Mini/micro-hydro projects successfully generated electricity, not only enhancing access for many people but also creating opportunities for local business establishment. This access was further secured by the rehabilitation and restoration of existing hydro projects, ensuring electricity continuity for a large number of households. Complementing hydro efforts, Solar Home Systems provided essential electricity to numerous households, while the installation of solar mini-grids brought reliable lighting to communities, collectively expanding

the reach of clean energy across the country.

6.2 SUSTAINABLE DEVELOPMENT BENEFIT

AEPC's promotion of RE and EE generates a wide array of specific and direct sustainable development advantages.

Environmental Benefits: Efficiently utilizing locally available RE resources for power generation aims to substitute carbon-intensive fossil fuels and traditional biomass, ultimately leading to a substantial reduction in the emissions of both long-lived and short-lived pollutants.

Health Benefits: The provision of clean energy contributes to a decrease in household air pollution and accidents related to energy use, resulting in a significant reduction in respiratory and pulmonary health issues. Furthermore, the effective management of waste materials, such as dung, municipal waste, and human excreta, helps lower the incidence of diseases caused by disease vectors.

Economic Benefits: Gaining access to clean and environmentally friendly energy helps decrease the consumption of fossil fuels, thereby reducing the nation's reliance on imported fuels. The cost-effective nature of clean cooking solutions provides direct economic advantages to households. Additionally, the sector opens up new entrepreneurial possibilities, employment opportunities and enhances local income potential

through the sale of related products and accessories.

Social Benefits: RE projects intrinsically facilitate community engagement and cooperation in both project management and implementation. Likewise, waste-to-energy projects and biogas initiatives alleviate the social burden associated with efficient waste management.

Technology Transfer: Certain advanced RE technologies, such as large biogas and wind power, introduce new technological options, enabling local companies to become acquainted with and diversify their business portfolio in line with the latest global advancements in these technologies.

The technologies implemented contribute directly to the attainment of Sustainable Development Goals (SDGs) 3, 7, and 13. Additionally, they play a substantial role in advancing Goals 1, 2, 4, 5, and 6, and complement the achievement of various other goals.

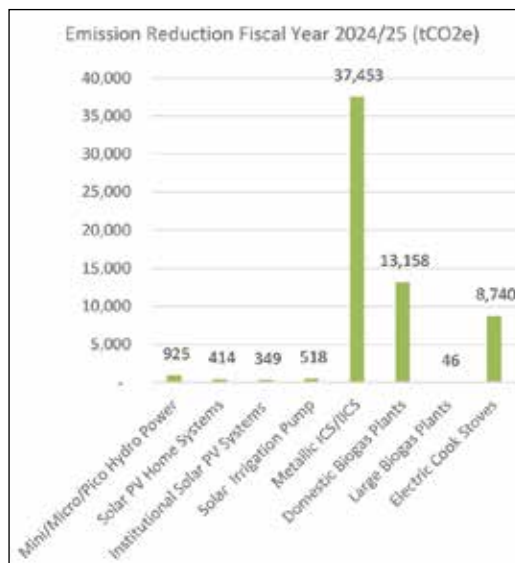


Figure 25: Key RE related Sustainable Development Goals

6.3 GREEN-HOUSE GAS EMISSION REDUCTION

During the reporting period, the RE technologies implemented by AEPC helped in reducing the emission of

significant amount of GHGs. The estimated amount of emission reduction achieved by the technology implemented in the reporting period is 61,603 tCO₂eq. The detail technology wise emission reduction achieved is given in Figure 26. The quantities of emission reductions given above are the estimated amount of emission reduction and do not resemble to the tradable ERs.



6.4 SUCCESSFUL CASE STUDIES

Emerald Energy Pvt. Ltd: A Model Project on Bio-CNG



One of the successful biogas sub-projects is Emerald Energy Pvt Ltd, located in Pratappur Rural Municipality, Nawalparasi district, Lumbini Province. This project is a notable example of sustainable commercial waste management and renewable energy production.

Project Details:

Project Details	Description
Location	Prataptpur Municipality, Ward No. 2, Nawalparasi District, Lumbini Province
Terrain	Terai
Substrates	Press Mud (35 TPD), poultry litter (10 TPD), cattle dung (15 TPD)
Technology	Continuously stirred tank reactor (CSTR) mesophilic digester with a double membrane gas holder
Final Products	~1000 kg/day of Bio-CNG (equivalent to 2400 m ³ of biogas) and 6 metric tons of fertilizer
Land Area	3 Bigha (20,317.89 m ²)

Commissioned on May 2025, the project integrates essential civil and electro-mechanical systems as per the approved design. The facility processes biodegradable materials to produce Bio-CNG and organic fertilizer, with independent technical and financial verification. The project adheres to environmental and social safeguard policies as outlined in the Environmental and Social Management Plan (ESMP). As of Oct 2025, the facility has begun supplying CNG gas to industries in Bhairahawa and Butwal, producing approximately 50 cylinders every day.

Empowering Farmer through Solar Irrigation: Evidence from DKTI Solar Project

Mr. Raj Kumar Chaudhary, a farmer from Chandrapur Municipality-9, Dumariya, in Rautahat District. Previously reliant on single-season paddy cultivation, his family (six members) struggled to meet basic needs due to the lack of irrigation facilities. Year-round farming seemed unattainable. Upon learning about the AEPC/DKTI Project, Mr. Chaudhary submitted the demand application for a solar irrigation pumping system (SIP-S). Following an assessment by DKTI-PIU Team, the SIP-S of 3 kWp capacity was installed, delivering approximately 100,000 liters of water daily. This enabled irrigation during the dry winter months, when fields typically lay fallow. With the availability of excess water, the farmer has diversified his business activity by starting fish farming as well. As a result, the family cultivated maize on previously unused land, earning around NPR 200,000 in a single season. This income boosts not only improved their financial stability but also restored their faith in agriculture as a viable livelihood, highlighting the critical link between energy access and economic security. Through this project, the farmer has remarkably scaled up his maize business-moving from selling by the basket to selling by the tractor load.



A similar transformation occurred in Arjundhara Municipality-11, Salbadi, Jhapa District, where a farming couple of Mr. Mahendra Raj Ignam, faced challenges in their vegetable and fishery operations due to unreliable grid electricity and costly diesel pumps. The installation of SIP-S provided a consistent supply of over 100,000 liters of water daily. With this reliable water source, they expanded their cultivation area, diversified crops, and increased yields. Mr. Mahendra noted that solar irrigation reduced operational costs and fueled their ambition to shift from subsistence farming to commercial agriculture. Their success highlights how solar pumping systems empower smallholder farmers to embrace market-oriented commercial production.

EV Charging Stations bring convenience and efficiency to electric vehicle users

Recognizing the importance of early infrastructure planning, the Government of Nepal, Alternative Energy Promotion Centre (AEPCC) through Sustainable Energy Challenge Fund (SECF) has been supporting private sectors for the installation of EV Charging stations throughout the country under innovative window. In close collaboration with 18 private companies, who approached AEPCC proactively for the support for innovative financing, AEPCC is accelerating the promotion of EV charging infrastructures enabling the environment of adoption of electric vehicles.



EV charging stations are currently operational in 72 locations mostly in high-traffic and strategic locations including Attariya, Chitwan, Nuwakot, Pokhara, Malekhu, Sindhuli, Bardibas, Itahari, Kathmandu, Bhaktapur, Lalitpur, and Damak. Each station is equipped with adequate charging guns supporting both GBT and CCS2 standards, providing up to 400 kW power, upgradeable to 800 kW in the future. Both GBT and CCS2 guns deliver maximum charging capacity of 250 kW, which ensures seamless and fastest charging for EV users based on their individual power requirements through innovative DC smart split charging technology.

The charging stations are equipped with adequate resting areas which brings convenience and efficiency to electric vehicle users and commuters, reinforcing Nepal's shift towards sustainable transportation. This enabled the displacement of fossil fuel being imported in the country thereby contributing to trade imbalance and clean environment.

Solar Dryer : renewable energy solutions for agricultural processing

Solar Dryer Project has successfully implemented in Palpa and Syangja, marking a significant milestone in promoting renewable energy solutions for agricultural processing. This initiative focused on the installation of solar-powered parabolic greenhouse dryers to support small-scale food processing industries, particularly benefiting local farmers and cooperatives. By leveraging a blended financing approach, the project facilitated cost-effective and sustainable post-harvest processing, ensuring market access and value addition for local agricultural products. With a drying capacity of 1050–1200 kg per batch, the project contributes significantly to reducing post-harvest losses and promoting environmentally friendly drying practices. The successful completion of this initiative showcases a scalable model that can be replicated in other regions to further enhance sustainable agricultural practices in Nepal.



Key Achievements:

- Drying time reduced to 3 days to 1 day, preserved origin food taste compared to open sun drying, dust free and hygienic dried food, benefited with longer preservation time.
- Creation of sustainable value chains for spices, fruits and vegetables
- Direct benefits to 250+ farmers (60% women) through improved incomes
- Reduction of post-harvest losses by an estimated 40-50%

The project's innovative blended financing model, combining AEPC/NREP funding, cooperative investments and technical support from Aastha Engineering, has established a replicable framework for sustainable agricultural infrastructure development in Nepal.

Conversion of Furnace Oil Boiler to Biomass Pellet Burner: A Case of Fuel Switching

Janda Devi Nepal Energy Pvt. Ltd., in association with the Alternative Energy Promotion Centre (AEPC), has been leading Nepal's clean industrial energy transition through the promotion of biomass pellet technology. The company has successfully implemented several RESCO model conversions in the food processing and wire melting industries, demonstrating the commercial, technical, and environmental benefits of renewable thermal energy solutions. Building on this expertise, Janda Devi Nepal Energy executed a landmark project at Dabur Nepal Pvt. Ltd., converting a 5 TPH furnace oil-fired boiler into a biomass pellet burner system. The conversion utilized a 30 lakh kcal fully automatic biomass pellet burner, integrated with automatic ash cleaning, a cyclone separator, and a wet scrubber for efficient combustion and pollution control.



The project was entirely financed by Dabur Nepal Pvt. Ltd., with Janda Devi Nepal Energy providing comprehensive research, technology sourcing, design, and installation services. Through this conversion, Dabur Nepal achieved approximately 40% reduction in fuel costs and an estimated greenhouse gas (GHG) emission reduction of about 950 tonnes of CO₂ per year. This transition not only enhanced operational efficiency and energy security but also significantly contributed to Nepal's low-carbon industrial development goals.

This successful implementation stands as a model for large-scale industries seeking sustainable alternatives to fossil fuels. Complementing this, Janda Devi Nepal Energy has collaborated with AEPC under SECF funding on multiple initiatives - including the Implementation of Biomass Pellet Stoves and Burners in MSMEs in Madhesh Province - helping expand the use of biomass energy technologies and strengthen the national biomass market ecosystem.

Solar Rooftop in Shiva Shakti Agri

The Shiva Shakti Agri Pvt. Ltd. located at Jeetpur, Bara has installed 730.36 kWp Solar Rooftop with support from AEPC/KFW-DKTI Solar Project. The energy produced from the Solar Rooftop (SRT) has significantly displaced the energy consumption of industry from diesel as well as minimized the consumption of grid electricity. Similarly, the project has significant contribution on environment and energy efficiency. Shiv Shakti Agri implements the ISO-22000 international standard for food safety measures to ensure the highest health and safety standards are maintained and to support international trade.



Total cost of project is NRs. 35,561,800 of which AEPC support is NRs. 6,132,147. The project reduced the consumption of diesel fuel by 47,640 litre per year. Installation of SRT also helped to reduce carbon emission by 791 metric tonne per year.

Grid Connected Bi-facial Solar PV Project with 2 Axis Tracker

Eco Renewable Private Limited working in electrification through clean and sustainable energy solutions has constructed 284.58 kWp ready to grid tied Solar Photovoltaic (PV) System at Hotel Mechi Crown, Mechinagar, Jhapa with the support from Sustainable Energy Challenge FUnd (SECF) managed by AEPC under NREP. The financial support was through innovative window of SECF being the first of its kind technology promoted in Nepal. This system features a ground-mounted 2-axis sun-tracking mechanism, enhancing solar energy capture by following the sun's path throughout the day, thereby improving overall energy generation efficiency. The project accommodates features of agro-photovoltaic enabling farming environment having crops under the PV modules. With the enhanced facility of 2 axis tracking system along with bi-facial modules has improved total energy generation of the system by 10 to 15% depending upon the climatic environment. This clean energy system has significantly displaced diesel fuel being used at hotel.



A Two-axis tracker hold the potential for maximum yield owing to its total freedom of movement (north–south and east–west), the tracker can face the sun's rays throughout the day, across seasons. Since this design obviously requires higher automation and more moving parts driving up the costs, the solution was sought in creating large tracker tables with more Solar PV modules packed together, thus minimizing the costs.

HYPUMP Turbine Irrigation Project in an Innovation GROWN Model

The Integrated Turbine Pump (HYPUMP-TURBINE (ITP)) project implemented in Machhapuchhre Rural Municipality 5, Rivan, Kaski, with support from Sustainable Energy Challenge Fund (SECF) under AEPC and supported by REEEP-GREEN has been providing a reliable water lifting solution and teach sustainable farming practices to farmers. The system operates using kinetic energy of water from the tailrace of Mardi Khola Hydropower Project. The project enhanced the existing water supply and enabled efficient irrigation for 7.5 hectares of land in 50 households. The HYPUMP-TURBINE (ITP) system, consisting of a turbine and centrifugal pump with capacity of 2.2 kW. The project greatly benefited the local farming community, improved agricultural productivity, and contributed to the socio-economic development of the region



This innovative integration of hydropower and agriculture not only optimizes the use of available water resources but also exemplifies a replicable model for clean energy-based rural irrigation. The project also complements capacity-building efforts, as farmers have been trained in improved farming practices and supported with agricultural tools, further enhancing the impact and sustainability of the intervention

Lift Irrigation Brings New Life to Jumla

In the beautiful hill village of Rara in Jumla, the Tila River flows quietly below the houses. Every morning, families wake up to the sound of the flowing river. But sadly, even though the river flows endlessly, the water cannot be used for farming in the hills above. The land remains dry, and crops suffer from lack of water. Ms. Rekha Budha, a local woman, shares that the river is too far below the village, making it impossible to use the water for irrigation. This is not only Rara's story, it's the reality for many villages across Jumla. Rivers like the Hima, Jawa, and Tila pass through different parts of the district, but the water often flows away unused. Even though the region has plenty of natural water sources, farmers in the hills cannot bring that water to their fields. As a result, crops



like apples, walnuts, beans, and potatoes are not growing well. Many farmers are forced to leave their land uncultivated and migrate to India for work. "In winter, we rely only on rain and snow for farming," says Krishna Khadka from Tatopani Rural Municipality. "If there's no snowfall, there's no harvest." Even apples, which Jumla is famous for, are not producing enough because of the irrigation problem. Over the past years, governments have spent a lot of money to build solar-powered lift irrigation systems in Jumla. But most of them failed to work properly, especially during winter when there's little sunlight. These systems were left unused and broken. Seeing this problem, local governments and development partners started looking for a better solution. Now, a new hope is rising with electric-powered lift irrigation. With support from the Norwegian government, the UNDP's Renewable Energy for Resilient Agro-Food System (RERAS) project together with the Alternative Energy Promotion Center (AEPIC) has helping communities build electric lift systems that bring water from rivers to the hill farms. These systems work anytime, regardless of sunlight or weather conditions. According to project officer Mr. Prithvi Bahadur Shah, six electric lift irrigation systems have already been built in areas like Patarasi, Chandannath, and Tatopani. "Electricity is more reliable for Jumla," he explains. "Farmers can irrigate their fields whenever needed, even in winter."

One of the successful examples is in Dangibada, Ward No. 2, where a lift irrigation system was installed at a cost of NPR 4.7 million. Another system is also running in Dhaulapani, Ward No. 6. These systems are now managed by user committees, and guards are hired to operate them. The once-dry land is now showing signs of life. Mr. Narendra KC, a farmer from



Dangibada, says, "Now that water is reaching our fruit and vegetable farms, we are expecting better harvests and more income." The chairperson of Tatopani Rural Municipality, Mr. Nanda

Prasad Chaulagai, also shared his happiness. “Earlier, we had eight solar systems, but none of them worked well. After we partnered with RERAS, the electric lifts have finally brought water to our hills.” He added with hope, “Now the dry fields above the rivers will turn green. With proper irrigation, Jumla can once again become a land full of fruits, vegetables, and opportunity.”

Powering Hope: Gita’s Leadership Lights Up Pandusen Once Again

“I am Gita Saud Thapa, 36, from Pandusen in Budhinanda Municipality-8. I proudly served as the Vice Chairperson of the Rehabilitation Committee of the Narigad I Micro Hydro Project, our community’s only source of electricity.”

For over a decade, the 37kW Narigad I MHP had powered around 325 households in Gita’s community. But in recent years, frequent outages had turned light into luxury. Damaged canals and intakes caused by floods, along with worn-out mechanical parts, often left the village in darkness for days.



Gita Saud Thapa, users committee vice chair

“Electricity was unreliable, and our daily lives were constantly disrupted,” Gita recalls. It changed when the RERAS project stepped in with financial and technical support. In the collaboration between the project and the community, the plant underwent complete rehabilitation, mechanical issues were resolved and civil structures were rebuilt, consequently, the plant’s capacity increased from 37kW to 45kW, adding a remarkable 25kW of new power after renovation. “The plant now looks brand new,” Gita says proudly. “We couldn’t believe how quickly the transformation happened just in one and a half months!”

The success was driven by strong community participation. The seven-member users’ committee, including Gita, managed everything from materials and labor to logistics. This teamwork ensured smooth implementation and strengthened local ownership of the project. Gita also recognizes that sustainability depends on better management. “Earlier, weak management led to frequent breakdowns,” she admits. “Now, with RERL’s guidance, we’ve improved governance through regular meetings, strict tariff collection, and a maintenance fund has been established.”

To ensure long-term sustainability, local operators were trained to repair and maintain the plant, building up the technical confidence within the community. For Gita, the project was empowering in more ways than one. “As the committee’s vice-chair, I also worked as a laborer during construction and earned NPR 15,000 in wages. It was a proud moment working for my community’s brighter future.” Today, Pandusen shines again, powered by teamwork, resilience, and the leadership of women like Gita Saud Thapa.

Sewing Dreams into Reality: Saroj Shrestha's Entrepreneurial Journey

Saroj Shrestha grew up in the remote district of Jumla, Nepal, where opportunities were scarce, but resilience was abundant. His mother, a determined woman with a vision, started a small tailoring training center to empower local women. With just a few sewing machines, she taught them the art of stitching, hoping to create financial



independence within the community. Years later, her son, Saroj took this humble beginning and transformed it into a full-fledged garment industry named “Himalaya Garment Industry”. What started as a small training center had grown into a thriving business over five years, with 8 workers dedicated to crafting high-quality tracksuits.

Over the past year, his business has not only provided him with stable income but has also created employment opportunities in the village. Currently, he employs 8 workers. He gives wages to the employees on the basis of number of tracksuits they make in a day.

According to him, before Chukeni micro hydropower project, the process of making tracksuit and housedress relied only on generator, which was expensive (i.e. they used 10 litres of diesel oil daily costing 200 per liter). At present, after using the electricity from the Chukeni micro hydropower project, production became more efficient, reducing costs up to NPR 40,000 per month. He is working with 58 schools, supplying uniforms to over 18,000 students. His operations expanded rapidly, and his annual revenue reached 30-40 lakh rupees. In the coming future, he aims to expand into producing jackets, creating even more jobs and installing more machines and a dream to take their brand to greater heights

A case of Rehabilitation of MHP through collaboration between AEPC and UNDP

AEPC in collaboration collaborating with UNDP has been supporting communities in Karnali and Sudurpaschim Provinces to rehabilitate micro hydropower plants since 2022 which were built by AEPC support some years back. In FY 2081/82, resource was mobilized from the Government of Norway through UNDP's Renewable Energy for Resilient Agri-Food Systems (RERAS) project to rehabilitated 7 MHPs affected by earthquake in Jajarkot and West Rukum districts. Similarly, 19 MHPs in Jumla and Bajura districts were rehabilitated in previous fiscal years with financial resource mobilized from the Government of Japan and the Government of Norway. These MHPs were in very poor state due to damages from natural hazards and/or improper handling and most of them were generating electricity less than half of their installed capacities or entirely shutdown. These efforts have resulted in access to clean, reliable and affordable electricity to 20,697 households equivalent 90,445 people. Likewise, 236 enterprises that employ 345 people including 134 women, have taken advantage of reliable and quality electricity supply.

The project not only supported for rehabilitation/repair of physical damages but also mobilized the communities extensively and strengthen their institutions, mostly cooperatives and users' groups to build up their capacities for smooth operation and management. Besides, the project also supported for promotion of productive uses of energy, GESI mainstreaming and introduced several innovations which could be replicated elsewhere are discussed below.

Institutionalization: The focus of strengthening community institutions was to ensure transparency and accountability in governance and efficiency in management, which was achieved to a large extent after reconstitution of the executive committees (EC) and introduction of computerized billing and accounting of all financial transactions. The ECs became more representative by including women and members of marginalized communities, penned their own rules and regulations and practiced incentive-based management system. Consequently, there has been notable increase in people's trust and confidence in their respective institutions and the positive shift in their perception reflected by willingness to pay not only electricity fee on time but also to settle due bills accumulated for several months and even years in some cases. For example, Baddigad MHP, Bajura alone was able to recover about NPR 800,000 in overdue payments within 4 months of formation of the new EC. Similarly, Barjugad I, Kasegad III, Kuru Khola, Ikadigad I and Narigad II MHPs also in Bajura have been successful to collect NPR 815,000 of similar dues. Further, after the introduction of rebates for timely payment, customers are now paying their bills on time.

Digitalization: In the remote villages of Nepal, where traditional financial transactions often face delays due to long distances from the market centers, a digital transformation is revolutionizing the way people pay for electricity. Through the efforts of RERL, micro hydropower plants (MHPs) are now integrating computerized account-keeping systems and online payment methods, making transactions smoother, more transparent, and efficient. So far, 26 MHPs have adopted computerized billing systems, and 10 of them have successfully introduced online payment platform through e-Sewa that allows consumers to pay their monthly electricity bills remotely. This initiative has reduced the time and effort required

for payments while improving revenue collection for the MHPs. The impact was immediate, in just the first month of implementation, consumers from Barjugad I MHP paid NPR 55,600 and Malagad, Bajura NPR 124,000, and Giri Khola MHP, Jumla NPR 45,000 through this new mechanism. As more people become familiar with the system, the number of users is expected to increase, ensuring a hassle free, reliable and transparent financial transactions as illustrated by adoption of this system in Kuwadi Khola MHP beneficiaries located in the remote Himali RM. To further encourage digital transactions, the Management Committee of Baddigad MHP had initiated a cash-back incentive of NPR 4.35 per transaction for e-Sewa agents, which has led to a noticeable increase in the number of active users. To support this shift towards digitalization, 5 women have actively assisted in advocacy and orientation of community members which has resulted in enhanced interest in the system in nearby settlements too. This transformation is more than just a technological upgrade but also a shift towards financial discipline, self-sufficiency, and progress. By embracing digital solutions, these rural communities are ensuring sustainability of their energy systems while paving the way for a brighter and more connected future. This effort has to be encouraged in other MHPs too.

Micro Hydro Operated Lift Irrigation (MHOLI): Although AEPC had supported communities in Mahadevsthan of Dhading district to install 4 MHP-operated lift irrigation systems in mid 2010s with UNDP's financial assistance, due to lack of support in agricultural activities the communities could not take advantage of the facilities. Building up on this experience, AEPC and UNDP have supported deprived communities of Bajura and Jumla districts to develop 12 lift irrigation systems, including 7 in this fiscal year, and have integrated support for agricultural activities and value chain through UNDP's Renewable Energy for Resilient Agri-Food Systems project. The total daily water storage capacity of these 12 irrigation systems is 878,0000 litres and irrigate 105 hectares of land owned by 792 households even during the dry season. It has been observed that the productive of land has already increased significantly and up take of nutritious food among women and children has also improved, contributing towards food security and enhanced livelihoods of more than 3,546 people as envisaged by SDG 2.

Given Nepal's topography, micro hydro operated lift irrigation could be replicated and scaled up in almost all MHPs supported by AEPC. If access to irrigation results in improved agricultural productivity, rural livelihood will be enhanced significantly and bring back even abandoned MHPs to life.

Engendering Energy Utilization: Women are the main supplier, user and manager of energy in households and thus the project focused on alleviating their time burden and drudgery in collection of firewood for cooking. The project promoted 534 electric cooking devices in Jumla and Bajura. Although adoption of e-cooking was limited in the beginning, it is gradually increasing and more women are interested in electrical appliances. Likewise, women are encouraged to maximize benefits from access to clean, reliable and quality electricity supply. One of the ubiquitous enterprises preferred by women is replacement of manual sewing machines by efficient electric machines with high throughput. So far, RERL provided training and electric sewing machine with cost sharing basis for 55 women entrepreneurs in Bajura and Jumla.

Traditionally, women have not been active participants in the decision-making process of development activities although they contribute more than their share of voluntary labor for the same. However, the project has taken substantial strides towards gender empowerment and social inclusion, employing extensive effort and advocacy to engage municipal officials, users' committees and general population. As a result, 39% of the executive committee members of the 16 MHPs, supported for rehabilitation, are women providing them with a vital platform to voice their concerns and opinions in the decision-making process.

Fuel Switching: Ms. Urmila Budha, the proud owner of Kailash and Bimal Chowmein Udhyog, Patarasi, Jumla recently shared her excitement about a new addition to her business a 100 kg electric noodle steamer provided by AEPC/CREF/RERL through the RERAS project. With a beaming smile, Ms. Budha expressed how the noodle steamer has revolutionized her.

Foremost, Ms. Budha is extremely happy that she is saving about NPR 500 a day by switching from firewood to electricity. She is grateful that RERAS has introduced such an efficient and cost saving technology, which has eliminated indoor air pollution.

Moreover, Ms. Budha is highly impressed that the electric steamer does its job in one and a half hour what previously used to take four hours with firewood, saving her an impressive three hours each day, significantly improving her efficiency and productivity. She explained how this saved time is now channeled into other income-generating activities, household chores and leisure. Ms. Budha looks forward to continuing her work with greater ease and efficiency.

RERL supported Chandannath Cooperative, Jumla to procure and install an Apple Peeler, Slicers and Dryer on cost sharing basis. The equipment enables efficient processing of 120kg of apples within 6 hours that utilizing 72 units of electricity. Traditionally, people in Jumla have been peeling and slicing apple manually and to produce sun dried apple chips, which is both time consuming as well as less hygienic.

Lessons Learned

The project has demonstrated the efficacy of micro hydropower projects in off grid areas and the fact that they could be financially the most attractive alternative in specific locations. Further, rehabilitation efforts have resulted in 40% increase in power generation on an average paving way for more rigorous promotion of productive uses of energy for livelihood enhancement. However, the rehabilitation work has to be an integral part of other supports for institutional strengthening and digitalization, promotion of productive uses of energy, GESI mainstreaming, e-cooking and capacity development to be effective. In short, sustainability of activities hinges on the localization of knowledge and skills for operation and management, and technical backstopping. To achieve this, it is crucial for the institutions overseeing the



governance of MHPs to be transparent, accountable and capable. Close monitoring and ‘hand-holding’ for at least a couple of years are necessary to ensure their success.

Empowering Change: Leading Energy Development in Bajura- Ms. Maya Kumari Shah

Ms. Maya Kumari Shah a resident of Budhiganga Municipality–9 in Bajura, stands among the few women in Nepal leading micro-hydropower initiatives an inspiring example of how women’s leadership is transforming rural energy management and empowering communities in remote regions. Ms. Shah, is a proud consumer of electricity generated by the 100 kW Ikadi Gad Micro Hydropower Project (MHP). Following the rehabilitation of the Ikadi Gad MHP in March 2022 through the support of UNDP and AEPC, the Sanakisan Krishi Cooperative Ltd. assumed responsibility for its operation, transitioning from an users’ committee. As a Chairperson of Cooperative, Ms. Shah has been efficiently managing the project, ensuring sustainable power supply and community ownership. She also has been actively involved in community advancement through the Sanakisan Krishi Cooperative Ltd.

SASEC – Off Grid Component: Progress and Impacts

Background:

The Government of Nepal, through the Alternative Energy Promotion Centre (AEPC), is implementing the South Asia Sub-Regional Economic Cooperation (SASEC) Power System Expansion Project with financial support from the Asian Development Bank (ADB), comprising Loan 3139-NEP and Grant 0398-NEP, following an agreement signed on 11 July 2014. The project aims to support Nepal’s energy goals by expanding both on-grid and off-grid renewable energy (RE) supply, promoting cross-border power exchange, improving rural energy access, and enhancing sector capacity. The off-grid component focuses on improving rural livelihoods through RE use in enterprise, education, health, and agriculture, in alignment with ADB’s Country Partnership Strategy.

The Ministry of Energy, Water Resources and Irrigation (MoEWRI) serves as the executing agency, with AEPC as the implementing agency. Funding includes a US\$5 million credit line from ADB’s Special Funds and an \$11.2 million SCF grant for mini hydropower (MHP) projects and Solar Wind Hybrid Mini Grid projects. However, due to reallocation of \$1.5 million to consulting services and increased subsidies under a revised policy, a \$6 million funding gap emerged for the MHP component, which the government plans to cover through counterpart funding. The project also includes capacity building for AEPC through management support, planning, feasibility studies for wind energy, and livelihood enhancement activities. The Renewable Energy for Rural Livelihood (RERL), a joint project of AEPC and UNDP is assisting in implementation.

The main objective of SASEC Off Grid Component implemented by AEPC is to develop 4.3 MW of mini hydropower projects (MHP) and 0.5 MW of solar and solar wind hybrid mini grids (SMG) to provide electricity access to 30,500 households.

Project Progress

All 9 SMGs with total installed capacity of 0.565 MW providing electricity access to 1632 households have been completed and further 1500 households have solar home systems.

Similarly, 5 out of 7 MHPs with 2.098MW total capacity or 49% of the targeted 4.3MW are operational under the SASEC initiative and the remaining 2 are under construction. In the case of Khatyad Khola MHP electromechanical equipment has been installed and all most all civil works have been completed. These completed projects serve 16,731 households. Thus, 19,863 households against the target of 30,500 or 65% have access to electricity from SASEC supported Subprojects or NEA.



The most notable immediate impact of SASEC MHPs is in Jumla, as Giri Khola and Chukeni Khola MHPs are the main sources of electricity in Chandannath Municipality and surrounding areas and supply electricity to 11,450 households and more than 500 enterprises mostly NEA customers. Both these MHPs have entered into net-metering agreement with NEA for exporting surplus energy.

Project Impacts

The project activities are already showing a transformative impact on rural communities by institutionalizing inclusive, decentralized energy governance and driving local economic growth. As envisaged, the project has been able to also empower marginalized groups, especially women and Dalits, by fostering leadership, skill development, and energy-enabled livelihood diversification. By July 2025,



257 groups (4,831 members; 93% women, 33% disadvantaged groups-DAG) have collectively saved NPR 26 million and invested NPR 30 million in livelihood loans, 90% of the borrowers are women. A total of 213 marginalized households has received electrical appliances for cooking reducing indoor air pollution and women's household workload. Further, as gender inclusion is a project priority, more than 60% of trainees in leadership, management, cooperative education, financial literacy, etc. are women and as a result, they hold 54 (34%) of leadership roles in cooperatives and users' groups. Moreover, as SASEC subprojects targeted off grid households for electrification, 71% of the beneficiaries belong to disadvantaged groups (DAG) as defined by the Government of Nepal or women headed. Collectively, these changes are promoting greater participation, social equity, and long-term community resilience. Some of the project impacts are mentioned below:

After access to reliable and quality electricity supply by 14 SASEC subprojects, 904 enterprises are directly benefiting 1,323 individuals including 626 (47%) women. Moreover, 352 (39%) of these enterprises are led by women. Availability of reliable and quality electricity has not only spurred establishment of new enterprises but also helped fuel switching in existing commercial ventures like the Yarsa Water Bottling Plant and Sandesh and Jenish Bakery

and Noodle Udhog in Jumla from diesel and/or firewood to clean energy sources, reducing production costs as well as carbon emission. Both these enterprises are women owned. Similarly, in Lasi Bazar of Patarasi RM, a cluster of tailoring shops has emerged, about a dozen women have switched to electric sewing machine and are able to provide services to entire RM as their throughput has tripled. Women led enterprises have not only helped diversify household incomes and reduce economic vulnerabilities but also positioned women as key drivers of local economic growth and self-reliance. Another notable

Ms. Dhana Kali Bohara earning NRP 30,000 per month from an electrified tailoring business, exemplify how infrastructure, access to energy, and targeted support can elevate women's economic roles and spark localized prosperity. In some project communities, savings-and-credit activities also gained momentum further strengthened economic resilience. Prior to the project, rural economies offered limited income opportunities and relied on costly, inefficient energy sources. The project's widespread electrification spurred micro-enterprise growth, empowered women, and fostered resilient, diversified local economies.



example is Ms. Ambika Shrestha, a woman with physical disabilities and a single mother, who expanded her garment factory in Jumla and employs 7 other women after receiving reliable supply of electricity, which is exemplary as a woman with disabilities has emerged as job creators, thereby reshaping gender and social norms within her community.

On the other hand, in Tatopani, Jumla the blacksmiths relying on traditional charcoal-based energy systems have transitioned to electric machines for cutting and welding thereby saving time and reducing health risks and carbon emission. These technological advances have elevated living standards, enhanced occupational health, and positioned marginalized communities as skilled participants in modern value chains, fostering dignity and economic inclusion.

Municipalities' involvement as co-financiers and shareholders in mini-grid systems has advanced decentralized and participatory energy governance, ensuring local ownership and long-term commitment. The project helped to institutionalize community-led governance through user groups or cooperatives managing energy systems and collecting regular fees, ensuring proper O&M and transparency via public hearings and social audits. Some local governments have also developed formal energy plans and policies, including a five-year Municipal Energy Plan (MEP) and standardized electricity usages guidelines, strengthening regulation and equitable access.



AEPC and GCF officials meet in Kathmandu to review the implementation progress and evaluate the impact of the Clean Cooking Solutions Project

PROBLEMS, CHALLENGES AND LESSONS LEARNT

7.1 ENERGY SECTOR CHALLENGES

The renewable energy (RE) and energy efficiency (EE) sector continues to grapple with political, operational and financial constraints. According to a recent review, an enduring knowledge-and-information gap persists among government authorities.

The country's recent transition to a federal structure has added complexity to coordination of RE initiatives across the three tiers of government (federal, provincial and local). While Local Levels are now exclusively responsible for planning and implementation of Alternative Energy, they often lack sufficient technical and managerial capacity to do so effectively.

Meanwhile, the energy system remains heavily reliant on conventional resources: run-of-river hydropower dominates electricity generation and nearly 60 % households still depend on traditional biomass for cooking and heating. This dual dependence remains as big challenge to achieve clean energy transition.

Furthermore, awareness remains limited regarding renewable energy options and financing mechanisms. Demand-side momentum is weak, with only modest private-sector engagement to date. Key recommendations will be strengthening institutional mandates, deploying blended finance and VGF-style instruments at scale, formalizing grid-integration protocols for distributed RE, and prioritizing productive-use models to sustain off-

grid investments.

7.2 CONTEXT AND SIGNIFICANCE

Nepal's energy sector is dominated by hydropower, which remains the country's primary electricity source and the principal exportable commodity in the regional power market. In 2025, Nepal achieved a milestone by beginning electricity exports to Bangladesh via Indian Grid signaling the emergence of a regional trading role for Nepal's clean electricity. This new dynamic highlights the dual imperative of (a) maximizing the social and economic benefits from national RE deployment, and (b) diversifying the domestic energy portfolio to reduce vulnerability to seasonal hydrological variability.

At the same time, AEPC and its implementing partners have continued to drive distributed renewable energy, energy efficiency and clean energy transition programmes, supported mainly by various DP-funded programmes. These efforts have materially improved access to modern energy services while generating lessons on sustainability, private-sector participation

7.3 ISSUES IN RE AND EE

Institutional and governance fragmentation: The constitutional shift to a three-tier federal system has created more proximate decision-making but also introduced coordination gaps. Provincial Governments and Local Levels now carry greater responsibilities for planning and implementation;

however, gaps in technical capacity, procedural alignment and data exchange hamper consistent program delivery. This misalignment constrains permitting, interconnection, and operational oversight for both mini-grids and grid-connected distributed resources.

Financial and bankability constraints:

Financing remains the most binding constraint to scaling RE/EE. Although blended finance mechanisms and viability gap funding (VGF) (e.g., components of SECF) have shown promise in mobilizing private interest, many projects still suffer from limited counterpart funding, weak bankability of community projects, and high perceived risks for private investors in community-owned off-grid assets. Concessional and results-based finance are made available, but effective de-risking instruments and differentiated incentives are needed to catalyze institutional capital.

Technical standards, quality assurance and operation & maintenance:

Widespread variance in technical quality, insufficient O&M financing and the absence of sustainable business models for many off-grid systems result in deteriorating asset performance. Many mini-grids and community systems are being managed just as “community assets” rather than as professionally run social enterprises, which undermines long-term service delivery and revenue collection. Standardization of technical specifications and contracting models, and improved vendor/installer quality assurance, remain priorities.

Human resources and data systems:

The sector faces high turnover of skilled human resources, limited local technical expertise (particularly at provincial and municipal levels), and fragmented data systems. Institutionalizing a National

Renewable Energy Management Information System (NREMIS) would significantly improve planning, monitoring and investor due diligence but remain incompletely implemented. Strengthened HR pipelines and digital data platforms are therefore essential.

7.4 LESSONS LEARNT

Program implementation yielded critical lessons for future strategies:

Design RE for productive use and local enterprise:

Projects that integrate productive -use applications (e.g., agri-processing, irrigation, cold storage, micro-irrigation) create electricity demand and revenue streams that improve the financial sustainability of off-grid systems. Interventions treated as catalysts for small enterprise growth yield higher long-term uptake and durability. Field experience confirms that demand stimulation is as important as supply.

Blended finance and VGF work, but need scale and continuity:

Implementation of VGF support through SECF has clearly demonstrated the ability to attract private sector investment when combined with transparent procurement and structured performance incentives. Scaling up these instruments and availing the continued technical and financial support through such instruments has remained a challenge mainly due the unavailability of financial resources. Hence, dedicated efforts and longer-term resource commitments particularly from DPs are needed to scale up and continue such innovative instruments.

Shift development partner engagement toward investment and results:

DPs’ modalities are transitioning from grant-based support to investment and results-based financing. This

shift requires capacity strengthening of government and private sector to develop bankable projects and absorb investment instruments such as guarantees, first-loss facilities and outcome payments. Looking at the current economic situation of the country, Nepal needs sometime to be come better prepared for such transition and the transition needs to be made gradual.

Prioritize institutional clarity and regulatory frameworks: AEPC's success is constrained by its statutory status; upgrading legal frameworks (a dedicated RE & EE Act and associated regulations) would improve predictability for investors, integrate RE/EE mandates across sectors (agriculture, health, municipal services) and provide an authoritative basis for national quality and interconnection standards. Hence, the approval of the RE & EE Bill needs to be taken up with high priority to create a sound regulatory environment.

7.5 OPPORTUNITIES AND EMERGING TRENDS

Regional power trade and export potential: The inauguration of electricity exports and regional trading arrangements creates demand for more predictable, dispatchable and bankable generation, increasing the strategic value of diversified RE portfolios (e.g., solar, wind, storage) to complement seasonal hydropower. Cross-border market access can be a major revenue source if Nepal couples domestic electrification with export-grade grid reliability. Grid integration of DRE helps in the grid resilience and reliability, reduced cost, improved quality and efficiency as well as enhanced energy security.

Climate finance and NDC alignment: Nepal's updated NDC (NDC 3.0) and

commitments towards a low-emissions pathway open windows to climate funds (GCF, CIF) and green finance facilities. Mobilizing these resources for integrated RE/EE programmes (including municipal energy plans and large-scale biogas/waste-to-energy) can reduce project financing costs and improve private participation through de-risking.

Technological innovation and sector diversification: Declining solar and storage costs, advances in grid-forming inverters and digital monitoring enable hybrid solutions that combine utility-scale renewable power with distributed assets and storage. This technology mix is essential to manage seasonal variability, facilitate grid integration and support new applications (e.g., e-mobility, e-cooking, green hydrogen).

Local enterprise and municipal energy planning: Municipal energy planning and entrepreneurship at local levels offer high-impact entry points for integrating local investments with subnational and national funding, unlocking co-benefits across public services (e.g., water, street lighting, municipal buildings) and private micro-enterprises. Focused municipal programmes can accelerate demand aggregation and project bankability.

7.6 STRATEGIC RECOMMENDATIONS

- ❖ **Enact a Renewable Energy & Energy Efficiency Act:** provide statutory clarity, empower AEPC (or successor body) as a national centre of excellence, and create regulator pathways for relevant RE and EE initiatives including mini-grid interconnection.
- ❖ **Scale blended finance and VGF mechanisms:** Institutionalize SECF-type windows with clear

procurement rules, standardized VGF disbursement criteria, and integration into climate-finance pipelines (GCF/CIF). Pilot first-loss instruments to mobilize institutional investors.

- ❖ Formalize grid-integration protocol for distributed RE: Standardize interconnection, metering and safety requirements for mini-grids and rooftop systems, enabling technical and commercial net-metering or feed-in arrangements.
- ❖ Prioritize productive-use and market-oriented business models: Co-design RE projects with agricultural and micro-industrial stakeholders to secure demand and revenue.
- ❖ Strengthen sub-national technical capacity and NREMIS: Invest in provincial/municipal energy offices, operationalize NREMIS

as a master database for project pipelines and monitoring.

- ❖ Mobilize regional and export opportunities strategically: Leverage cross-border agreements to create anchor demand for dispatchable renewable energy and storage projects.
- ❖ Adopt standardized procurement, QA and O&M frameworks: Improve quality assurance for RETs, require performance bonds for contractors, and incentivize professional O&M service providers.
- ❖ Embed climate resilience: Align projects with climate risk assessments and resilient infrastructure investment to reduce procedures to enhance integrity and prioritizing compliance-related findings.



ANNEXES

Annex-1: Progress achieved in 2024/25 (AEPC)

SN	Activity/Program	Unit	2024/25		
			Target	Achievement	% Achievement
1	Improvement and Reconstruction of Clean Development Mechanism (CDM) Registered Micro Mini Hydro and Improved Water Mill	No.	8	9	112%
2	Detail Feasibility Study of Solar Mini Grid Projects	No.	10	10	100%
3	Detail Feasibility Study of Institutional, Community Biogas plants	No.	10	0	0%
4	Orientation and Capacity Building of Local level, province level and stakeholder for RE	No.	1	1	100%
6	Solar pump for irrigation	No.	172	200	116%
7	Electricity generation from mini grid project (Multiyear program)	KW.	400	378	95%
8	Solar Home System installation in community and religious places	No.	100	107	107%
9	Integration of micro/mini hydro projects in national grid	No.	2	0	0%
10	Incomplete and sick micro hydro completed and rehabilitation	No.	7	6	86%
12	Clean energy program: replacement of dung cakes and agricultural residue for cooking	No.	15000	15100	101%
13	Support in energy efficiency to public and private institution	No.	2	2	100%
14	Productive energy use of RE technologies	No.	3	0	0%

Annex-2: Progress achieved in 2024/25 (NRREP)

SN	Activity/Program	Unit	2024/25		
			Target	Achievement	% Achievement
1	Community and Institutional Biogas Plant	No.	10	9	90%
2	Installation Access to clean energy with Household Biogas Installation	No	5000	4386	88%
3	World Bank supported Nepal Mini grid related W2E, solar/mini and micro hydro development grant and loan	No.	6	0	0%
4	Electrification through mini hydro installation (including SASEC project)	Kw.	500	0	0%
5	Solar home system for un-electrified areas	No	5000	4142	83%
6	Solar water Pumping for Irrigation and Drinking water	No.	200	57	29%
7	Institutional Solar and Solar rooftop System Installation	Kw.	3200	5925	185%
8	Clean Cooking Solutions Project Implementation Under GCF	No.	20	14	70%
9	Tier 3 improved cook stoves and rocket stove installation at institutional and household level.	No.	4000	320	8%
10	Carbon and climate change related activities	No.	4	3	75%
11	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on community electrification	No.	10	3	30%
12	Nepal Mini-grid related activities	No.	10	5	50%
13	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on solar	No.	4	3	75%
14	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on bio energy	No.	5	3	60%
15	Third party monitoring of Household based RETS Power output verification and testing of micro/mini hydro projects	No.	5	5	100%
16	Environment and social safeguard	No.	3	1	33%
17	GESI related activities	No.	2	2	100%
18	DKTI related activities (solar energy promotion in rural and semi-urban areas)	No.	10	5	50%
19	Sustainable Energy Challenge Fund for promotion of RETs	No.	20	20	100%
21	NRREP Management Expenditure	No.	10	10	100%
22	Electricity generation from mini grid project (Multiyear program)	Kw.	368	0	0%
23	Promotion of Clean Cooking technologies under GCF	No.	80000	32000	40%
24	Technical Assistance for SASEC Projects	Percent.	33	33	100%
25	Electrification through pico, micro and mini hydro projects	Kw.	200	402	201%

Annex-3: List of AEPC Core Staffs

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45	Mr. Lil Bahadur Moktan	Driver	-	
46	Ms. Ratna Kumari Timilsina	Office Helper	-	
47	Ms. Bimala Khatiwada	Office Helper	-	
48	Mr. Shishir Thapa Magar	Office Helper	-	
49	Ms. Samjhana Dangol	Office Helper	-	

Photo of AEPC Core Staff





EV Charging Station installed by Shaileshwori Group at Silgadhi, Doti with support from AEPC/SECF



Grid connected Bifacial Solar PV System with 2-Axis Trackers installed at Hotel Mechi Crown, Jhapa



Agreement Signing Between AEPC and UNDP to promote renewable energy in Nepal.



POSTED Closure Workshop



Development Partners Meet



CREF Investment Committee Meeting



Demonstration and distribution of Tier 3+ ICS in Butwal Sub-Metropolitan City



Visit of GCF Independent Evaluation Unit, LOTRA team at Devchuli Municipality, Nawalparasi East



Workshop on Carbon Financing Opportunities in Energy Sector



Interconnection of solar mini grid (100 kW) into national grid at Susta, Nawalparasi (Ba.Su.Pu.)



South-South Triangular Cooperation on Decentralized Renewable Energy with focus on Grid Integration Nepal-Indonesia-Germany (SSTC DRE Nepal) held on Kathmandu



Visit to Micro Finance Institution by Biogas Credit Unit Team



Press Meet organized by AEPC



Blood Donation Programme organized on the Occasion of 28th AEPC Day



Celebration of 28th AEPC Day



Stakeholders Interaction on the occasion of Energy Transition Summit 2025



Nepal Delegation to SASEC Energy Working Group Meeting in Thimphu, Bhutan (Nov 2024)



Asia Clean Energy Forum participation in Philippines



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