Government of Nepal

Ministry of Energy, Water Resources and Irrigation

Alternative Energy Promotion Centre

Progress at a Glance: Year in Review
FY 2080/81 (2023/24)

Hon'ble Dipak Khadka
Minister
Ministry of Energy, Water Resources & Irrigation

Government of Nepal
Ministry of Energy, Water Resources & Irrigation

Singhdurbar, Kathmandu, Nepal
www.moewri.gov.np

Letter No.

Ref. No.

MESSAGE FROM THE HONORABLE MINISTER

I am immensely pleased to congratulate Alternative Energy Promotion Centre (AEPC) on this auspicious occasion of 28th Annual Day of AEPC. AEPC is serving as the nodal agency of the Government of Nepal on Renewable Energy (RE) and Energy Efficiency (EE). The dedicated efforts of AEPC have been instrumental in enhancing clean energy access, especially in remote areas of Nepal. The activities of AEPC are aligned with the broader objectives of the Government of Nepal to adopt the low-carbon economic development pathway.

The Government of Nepal recognizes the crucial role of Renewable Energy (RE) and Energy Efficiency (EE) in driving socio-economic development. Our constitution and laws emphasize sustainable natural resource use. The Renewable Energy and Energy Efficiency Bill, approved by the Council of Ministers and now before the National Assembly, will soon establish a legal framework to boost RE and EE growth in Nepal.

The Alternative Energy Promotion Centre (AEPC) has delivered modern energy services to over 20% of households, mainly in remote areas. Despite national grid expansion, off-grid RE remains essential given Nepal's challenging landscape. AEPC's initiatives align with Nepal's net-zero emissions goal by 2045.

In fiscal year 2080/81, AEPC made significant progress toward the 100% electrification goal. Its promotion of electric and bioenergy-based clean cooking solutions aligns with government priorities. AEPC's innovative business models, partnerships, and climate efforts, including Green Climate Fund accreditation and carbon projects, are commendable.

On this occasion, I extend my gratitude to Development Partners, Provincial Governments, Local Levels, the private sector, academia, civil society, and the AEPC team for advancing our mission of affordable, reliable, and sustainable energy for all.

Government of Nepal
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2074

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Mr. Dipak Khadka

Hon. Minister, Ministry of Energy, Water Resources and Irrigation (MoEWRI), and

Chairperson, Alternative Energy Development Board

Hon'ble Purna Bahadur Tamang
State Minister
Ministry of Energy, Water Resources & Irrigation

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Ministry of Energy, Water Resources & Irrigation

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Letter No.
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MESSAGE FROM THE HON'BLE STATE MINISTER

With high regards, I would like to extend my best wishes to Alternative Energy Promotion Center (AEPC) upon completing 28 years of its remarkable journey. At this joyous moment, I congratulate the entire AEPC team and all the associated stakeholders for their meticulous efforts towards streamlining renewable energy and energy efficiency sector, and improving access to clean energy technologies like solar, mini and micro hydropower, biogas, wind, improved cook stoves, hybrid systems and mini-grid systems across Nepal. AEPC's splendid efforts have significantly contributed for the reduction in dependence over traditional and imported energy, especially in the rural and semi urban areas of the country.

The Government of Nepal has prioritized the proliferation of renewable energy and adoption of energy efficiency for improving the livelihood of its citizens and improving the productivity. Since the establishment of AEPC in November 1996, the nation has witnessed accelerated efforts to help people utilize energy resources available in their vicinities by mobilizing financial and technical support. AEPC's effective partnership with government organizations, development partners and private sector has enabled the renewable energy technologies to penetrate deep into the societies while creating extensive entrepreneurship and employment opportunities. The policies and strategies adopted over the decades and the institutional experience gained have now been synthesized in the form of Renewable Energy and Energy Efficiency Bill, which is currently under discussion the in the National Assembly (upper house) of the Federal Parliament. Enactment of this bill will pave the way for the accelerated development of renewable energy and enerfy efficiency in the country and transform the current AEPC into a new organization with extended mandate.

Nepal continues to prioritize renewable energy through its periodic plans, programs and budget. With climate change being a global issue poised to inflict a substantial challenge upon an ecologically diverse but sensitive country like ours, the promotion of renewable energy has become a pivotal aspect of our policymaking. The current 16th Plan's focus on renewable energy and climate action reflects Nepal's growing national commitment to more effectively addressing growing climate change impacts. The recent plans are also congruous to the white paper published by our ministry that emphasizes on specific initiatives to improve and diversify energy uses in all the local levels of the country. The Government of Nepal is also equally conscious on distributing responsibilities among all three tiers of the government to equitably and effectively propagate adoption of renewable energy and energy efficiency that will eventually help us achieve our low carbon economic development and net zero emission goals and targets.

I take this opportunity to thank all our development partners for wholeheartedly supporting our government's initiatives to energize Nepalese households and empowering its people. AEPC's success has been accentuated with valuable support from its international development partners, government organizations, private sector, non-government organizations and civil society organizations. Lastly, I would like to wish AEPC all the success in its forthcoming endeavours and wish to see the institution thrive with its perseverance and dedication towards the sector.

Mr. Purna Bahadur Tamang
Hon. State Minister, Ministry of Energy, Water Resources and Irrigation (MoEWRI)

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MESSAGE FROM THE SECRETARY

I would like to extend my sincere congratulations to Alternative Energy Promotion Centre (AEPC) on the occasion of its 28th Annual Day. AEPC has been effectively undertaking its role as the government's focal agency on renewable energy and energy efficiency. Over the past 28 years, AEPC has played a crucial role in electrifying rural areas, providing clean cooking options and delivering clean energy services to the households, communities, institutions and enterprises, cumulatively benefiting more than three and a half million households. The extensive promotion and expansion of renewable energy services have led to improved quality of life in rural and sub-urban areas of Nepal. Decentralized and small-scale renewable energy sources promoted by AEPC ensure access to modern energy, avail reliable power, diversify energy sources, bolster energy security, reduce reliance on fossil fuels and traditional fuels, minimizing carbon emissions.

In the fiscal year 2080/81, AEPC has made commendable achievements resulting in the electrification of nearly 18,000 households and the provision of clean cooking solutions to around 33,000 households. Providing clean energy services to institutions and enterprises as well as mobilization of climate finance and carbon revenue are also the important achievement of AEPC. This progress aligns with the goals and targets set by the policies, strategies and plans adopted by Government of Nepal. However, reaching the most economically disadvantaged households in extremely remote areas remains still a challenge where AEPC is making its tireless efforts.

Promotion of renewable energy and energy efficiency also aligns with the targets set by the government in 16th Periodic Plan, Sustainable Development Goals (SDGs) Roadmap and Nationally Determined Contributions (NDC). The establishment and operationalization of Sustainable Energy Challenge Fund under Central Renewable Energy Fund mechanism of AEPC has really contributed towards these initiatives through Viability Gap Funding support to the project developers. AEPC is also playing a leading role in supporting the Provincial Governments and Local Levels in formulating policies, regulations, guidelines and procedures for the promotion, development and implementation of renewable/alternative energy and energy efficiency initiatives.

At this outset, I thank AEPC team for consolidating the progress and achievements in the form of this report. I hope that the publication of this report will help to disseminate valuable information to all stakeholders and the general public. Similarly, I would also like to thank Development Partners, Provincial Governments, Local Levels, private sector, academia, financing institutions, civil society organizations, user groups, community organizations, and all the partners and stakeholders for their contributions towards these accomplishments during the past years. I wish for your continued cooperation, collaboration and strong commitment in the days ahead.

(Suresh Acharya)
Secretary (Energy), Ministry for Energy, Water, Resources and Irrigation,
and
Member, Alternative Energy Development Board

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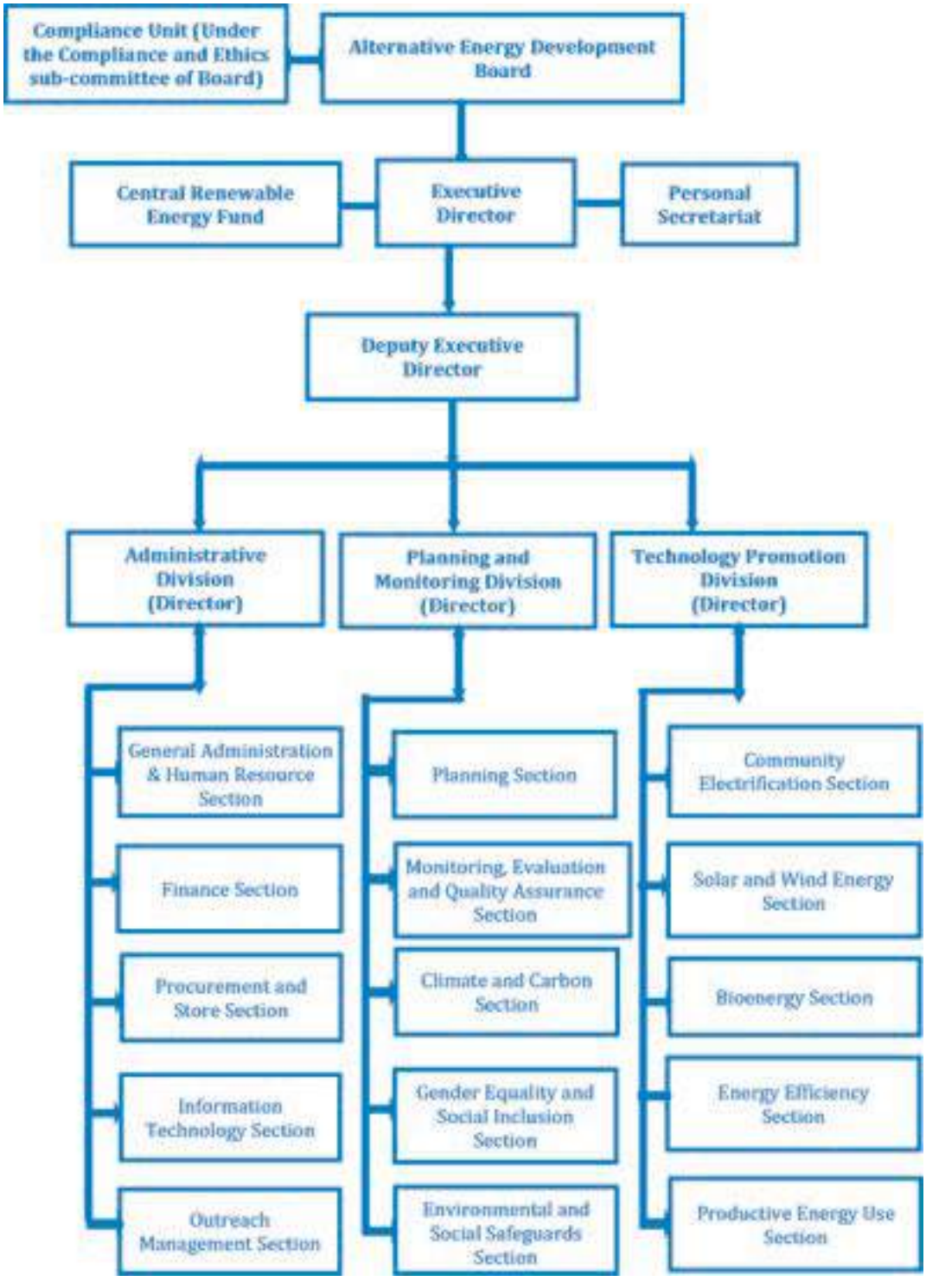
Mr. Nawa Raj Dhakal
Member Secretary
Executive Director, AEPC

ORGANIZATIONAL STRUCTURE OF AEPC



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EXECUTIVE DIRECTOR'S REPORT

The Constitution of Nepal 2015 guarantees the right to a clean environment and mandates that every citizen has the right to live in a clean and healthy environment. It further obliges the government to ensure a reliable supply of energy that is affordable and accessible to meet the basic needs of citizens. The state powers related with energy services are distributed among the federal, provincial and local levels as per the constitutional mandates (as per clauses 57 & 58 and schedules 5 to 9 of the constitution) urging for the collaboration, coordination and cooperation among all three levels for the development of energy sector. The federal set up of the nation puts emphasis on the inclusive socio-economic development and hence guides Alternative Energy Promotion Cenre (AEPC) to transform its' roles and responsibilities accordingly.

Nepal, blessed with abundant renewable energy potential, is strategically aiming to diversify its energy sources and accelerate the transition towards a sustainable green economy. The Government of Nepal (GoN) has recognized the energy sector as a national priority, outlining its goals in various strategic documents, including Sustainable Development Goals: Status and Roadmap (2016-2030), Biomass Energy Strategy (2017), National Energy Efficiency Strategy (2018), MoEWRI White Paper (2018), Second Nationally Determined Contribution (2020), Green Hydrogen Policy (2024) and Sixteenth Plan (2024/25-2028/29).

Established on 3rd November 1996 (18th Kartik 2053 B.S.), AEPC is mandated to promote, develop and deploy renewable energy (RE) and energy efficiency (EE) under the purview of Ministry of Energy, Water Resources, and Irrigation (MoEWRI). AEPC is partnering with Provincial Governments and Local Levels for effective implementation of RE and EE initiatives mobilizing the support from GoN, External Development Partners (EDPs), various national and international organizations, private sector, financing institutions, academia, civil society organizations and user groups. AEPC's experience with eight carbon projects under the Clean Development Mechanism (CDM) lays a solid foundation for developing future carbon projects under both the Paris Agreement and voluntary carbon markets. In 2019, AEPC became the first Direct Access Entity to the Green Climate Fund (GCF) from Nepal, enabling it to mobilize climate finance for projects focusing on mitigation, adaptation, and cross-cutting issues.

AEPC is honored to celebrate 28 years of service to the Nepali people, providing clean, efficient, affordable and modern energy solutions at the household, community, institution and enterprise levels. Our efforts have significantly increased the share of RE in the national energy mix, reducing reliance on traditional fuels and imported fossil fuels and promoting EE initiatives thereby strengthening energy security and reducing carbon emissions. AEPC has also played a key role in fostering energy entrepreneurship, creating employment opportunities and driving inclusive socio-economic development, thereby improving the quality of life for the Nepali people of Nepal especially in the rural and semi urban areas. Over the years, AEPC has supported around 15 million people in meeting their energy needs through deployment of appropriate RE solutions through technical assistance, subsidies, credit and viability gap funding (VGF). More than 500 companies and numerous local communities have led service delivery, creating employment opportunities for over 40,000 individuals.

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Since stepping into the role of the Executive Director in May 2023, I have been humbled by the cooperation that I received from all our valued partners and stakeholders. It has instilled in me a profound sense of responsibility, accountability and appreciation for mainstreaming RE and EE in Nepal. As we reflect on AEPC's 28 years of achievements, I am deeply grateful for the support from GoN and EDPs, the dedication of our staff members, and the commitment of sub-national governments, private sector, project developers, local communities and other stakeholders.

In our efforts to promote RE and EE, in fiscal year 2023/24, we have implemented various programs under two budget sub-headings: (1) Alternative Energy Promotion Centre (AEPC) incorporating targeted RE and EE programs as per the priorities of GoN, where physical and financial achievements reached 86% and 84% respectively, and (2) National Rural and Renewable Energy Program (NRREP) incorporating the programs and projects jointly funded by GoN and EDPs, where achievements were 81% and 78% respectively. The key physical progress of the reporting year includes installation of 1,312 kW mini/micro hydropower plants, 390 kW solar/wind minigrid plants, 8,306 solar home systems; deployment of 26,256 electric cookstoves and 4,508 metallic improved cookstoves; construction of 3,042 domestic biogas plants; 349 solar photovoltaic pumping schemes for drinking water and irrigation; and 311 institutional solar photovoltaic systems for powering remote healthcare facilities and community schools.

Moreover, in the reporting year, a total of 542,866 tons of CO_2 equivalent Emission Reductions (ERs) were issued from our CDM and Gold Standard projects and USD 2.85 Million carbon revenue was earned. Following the implementation of the Paris Agreement, we are currently advancing the development of large-scale biogas projects as carbon initiatives to facilitate Internationally Transferred Mitigation Outcomes (ITMO) under Article 6.2. Furthermore, in accordance with the decisions made by the Executive Board of the CDM during its 118th meeting, we have requested the transition of our existing CDM projects in to the Article 6.4 mechanism of the Paris Agreement.

Under the leadership of MoEWRI, AEPC has been rigorously engaged in the formulation of Renewable Energy and Energy Efficiency (REEE) Bill. The bill has been approved from the Cabinet and tabled in the National Assembly of the Federal Parliament. The bill is currently under discussion in the Committee for Legislation Management of National Assembly. During the previous year, we have emphasized on partnering with Provincial and Local Governments to foster an enabling environment and facilitate RE and EE initiatives. This includes providing support in capacity building, developing energy plans, and implementation of RE and EE Programs.

In the reporting period, AEPC continued the implementation of diverse projects and programs with support from different EDPs. With the support of UKAid (British Embassy Kathmandu), we have provided financial and technical assistance to various RE projects in Nepal via Nepal Renewable Energy Program (NREP) by providing VGF support under Sustainable Energy Challenge Fund (SECF) incorporated into the Central Renewable Energy Fund (CREF) of AEPC. In addition, technical and financial support from Renewable Energy and Energy Efficiency Program-Green Recovery and Empowerment with Energy in Nepal (REEEP-GREEN) funded by German Development Cooperation and European Union through GIZ have also been mobilized into SECF. To date, through SECF we have supported the installation of 28 solar water pumps, 6.1 MWp of solar rooftop systems and

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deployment of 30,000 electric cookstoves. SECF has supported the transition of 50 enterprises to RE and many projects are in the various stages of implementation.

Additionally, in the reporting period, we also continued implementation of South Asia Sub-Regional Economic Cooperation (SASEC) program supported by Asian Development Bank (ADB); Nepal Private Sector-led Mini Grid Energy Access Project (MGEAP) supported by World Bank; Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal supported by German Development Cooperation through KFW; Renewable Energy for Rural Livelihood Project supported by UNDP, Japan Supplementary Budget and ADB; Micro Hydro Debt Fund (MHDF) supported by GIZ/EnDev; and REEEP supported by German Development Cooperation through GIZ were also continued. Biogas Credit Fund (BCF), initially started with support from KFW, is also operational under AEPC to provide soft loan for biogas users through Local/Micro Finance Institutions.

Through a close cooperation with GCF and local governments, we have initiated the implementation of the first GCF-funded project "Mitigating greenhouse gas emissions through modern, efficient and climate-friendly clean cooking solutions (CCS)". This project aims to collaborate with local governments and private sector for accelerated deployment of clean cooking solutions and transform residential cooking sector by installation of 500,000 electric cookstoves, 490,000 tier 3+ improved cookstoves and 10,000 biogas plants in 150 Local Levels of 22 Districts in the Terai Region of Nepal over a period of five years benefitting 1 million households. Additionally, in the Fiscal Year 2023/24, AEPC-as the delivery partner of the Ministry of Finance to implement the GCF Readiness and Preparatory Support Programme - collaborated with a wide range of stakeholders including Federal Ministries, Provincial Government, Governmental Organization, Development Partners, Private Sectors, Civil Society Organizations (CSOs) and community-based organizations to enhance their capacity and develop a strategic project pipeline to bring about the necessary paradigm shift in accessing, implementing, and safeguarding climate finance in Nepal. Additionally, development of multiple Concept Notes and Funding Proposals is on progress as a part of AEPC's project pipeline to GCF.

Looking ahead, AEPC is committed to mainstreaming RE and EE initiatives by fostering partnerships with bilateral and multilateral development partners as well as international climate funds, and collaborating with provincial and local governments, private sector and other partners. As an accredited entity to the GCF, we are committed to increasing access to climate finance and enhancing resilience of energy infrastructures. I take this opportunity to sincerely appreciate the cooperation from our line ministry, Government Organizations at Federal, Provincial and Local Level, EDPs, private sectors, financial institutions, CSOs, users as well as the staff members of AEPC and its programs. I look forward to working together to continue improving energy access and contributing to a sustainable and resilient future for the people of Nepal.

Nawa Raj Dhakal
Executive Director

ABBREVIATION AND ACRONYMS

AEPC	Alternative Energy Promotion Center
AEDB	Alternative Energy Development Board
BAU	Business as Usual
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
EDP	External Development Partners
EE	Energy Efficiency
EJ	Exajoule
ESCOs	Energy Service Companies
ESS	Environmental and Social Safeguards
FY	Fiscal Year
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GESI	Gender Equality and Social Inclusion
GHG	Greenhouse Gas
GoN	Government of Nepal
ICIMOD	International Centre for Integrated Mountain Development
ICS	Improved Cookstoves
IEA	International Energy Agency
ISPS	Institutional Solar Photovoltaic System
IWM	Improved Water Mills
IWMI	International Water Management Institute
KfW	German Development Bank
kW	Kilowatt
kWh	Kilowatt Hour
LBG	Large Biogas
LFI	Local Financial Institutions
LPG	Liquefied Petroleum Gas
MAF	Mitigation Action Facility
MEP	Municipal Energy Plan
MGEAP	Nepal Private Sector-Led Mini Grid Energy Access Project
MHDF	Micro Hydro Debt Fund

MHP	Micro Hydro Projects
MICS	Metallic Improved Cookstoves
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MoF	Ministry of Finance
MSME	Micro, Small and Medium Enterprises
MSW	Municipal Solid Waste
MuAN	Municipal Association of Nepal
MW	Megawatt
NARMIN	National Association of Rural Municipality in Nepal
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
NREP	Nepal Renewable Energy Program
NRREP	National Rural and Renewable Energy Program
PEU	Productive Energy Use
PoAs	Program of Activities
PPP	Public Private Partnership
PVPS	Photovoltaic Pumping Systems
RE	Renewable Energy
RERA	Renewable Energy for Rural Areas
RERL	Renewable Energy for Rural Livelihood
RETs	Renewable Energy Technologies
RSC	Regional Service Center
RTSP	Regional Technical Service Provider
SAMS	Subsidy Administration Management System
SASEC	South Asia Sub-regional Economic Cooperation
SDG	Sustainable Development Goals
SDW	Solar Drinking Water
SHS	Solar Home System
SIS	Solar Irrigation System
SOP	Standard Operating Procedure
SREP	Scaling Up Renewable Energy Program
SRT	Solar Rooftop
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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Welcoming newly appointed Honorable Minister, Mr. Dipak Khadka (Ministry of Energy, Water Resources and Irrigation) at AEPC Office

CHAPTER 1

ENERGY SECTOR OVERVIEW

1.1 THE CONTEXT

Energy is a vital component essential for economic growth, social development, and technological advancement. Ensuring access to affordable, reliable, and clean energy is a fundamental human right, and addressing energy poverty is a critical global priority. The increasing demand for energy, coupled with the imperative to transition towards clean and sustainable sources, is a critical issue with far-reaching implications. In 2023, global primary energy demand increased by 2% (12.28 EJ), surpassing the 1.1% (6.6 EJ) seen in the previous year. Thissurge was primarily driven by renewable energy sources (excluding hydro) contributing 5.4 EJ followed by oil (4.81 EJ)and coal (2.5 EJ). The share of fossil fuels consumption in primary energy consumptiondeclined by 0.4%, reaching 81.5% in 2023. Emissions originating from energy sources reached an all-time peak of 40.4 billion tonnes of carbon dioxide equivalent, signifying a 2% rise compared to 2022. This transformation in the global energy landscape underscores the critical role energy plays in our society and the ongoing pursuit of cleaner and more sustainable energy sources.

In 2023, renewable power (excluding hydro) increased by 10.67%, reaching 50.58 EJ. This growth rate was slightly lower than the 14% increase observed in the previous year. Solar and wind capacity continued to expand rapidly in 2023, with a record addition of 462 GW. Among these additions, solar accounted for the majority at 75%, representing 346 GW of the capacity increase. Hydroelectricity generation experienced decrease of 1.9% in 2023, while nuclear power output declined by 4.4%.

In 2023, global electricity generation increased by 2.5% and reached 29,925 TWh. Wind and solar energy sources reached a record high, accounting for 13.2% of the total power generation. Solar power saw a remarkable 24.2% growth in electricity generation, while wind power experienced a 10.3% increase. Together, the combined generation from wind and solar once again exceeded that of nuclear energy. Coal remained the dominant fuel for power generation in 2023, maintaining a share of around 35.2%, slightly lower than the 35.4% in 2022. Natural gas-fired power generation remained consistent in 2023, holding a share of approximately 22.5%.Renewable energy sources (excluding hydro) met 15.9% of the net electricity demand growth in 2023. [1]

The energy demand and supply situation in Nepal reveals a disparity between the two. Given that energy is a fundamental driver of the national economy and socio-economic development, having an energy supply shortfall or what we refer to as "suppressed demand" can lead to compromises. Therefore, it is crucial to engage in careful planning and allocate resources to bridge this gap in the future. In the Business-as-Usual (BAU) Scenario, Nepal's electricity demand projection for 2040, based on a total population of 39 million and a GDP growth rate of 4.5%, is estimated at 1536 kWh. Figure 1 illustrates the projection of per capita

1 Statistical Review of World Energy, 2024, 73rd edition

electricity consumption in the BAU scenario from 2015 to 2040[2].

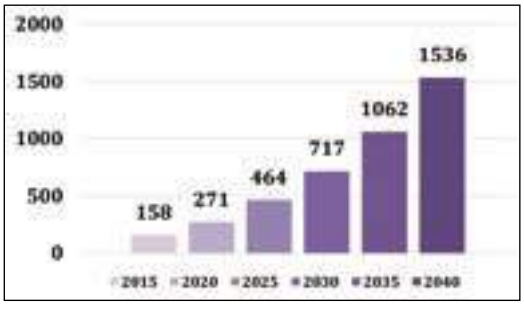


Figure 1: Projection of Electricity Consumption for 2015-2040 in kWh

1.2 NATIONAL ENERGY CONSUMPTION SCENARIO

In FY 2022/23, the total energy consumption in Nepal was 532.41 PJ and has seen a decline of 16.81% as compared to the previous year. This decline is primarily attributed to a reduction in the consumption of traditional fuels and fossil fuels. The traditional fuel consumption reduced by 17.2% while coal consumption and petroleum reduced by 41.50% and 16.14% respectively. The use of these fuels has been substituted by the use of grid electricity which has seen an increase of 21.18% while the renewable energy has seen an increase in 2.39%.[3]

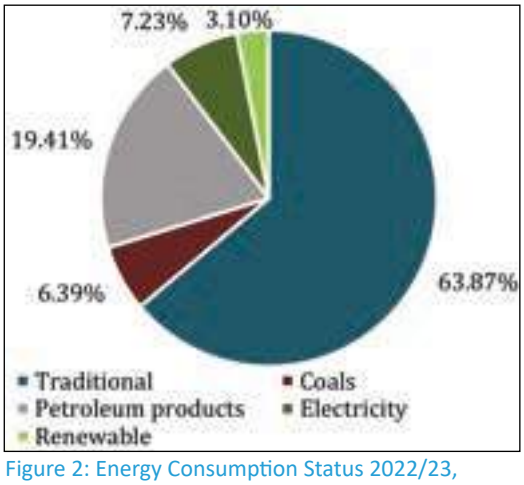


Figure 2: Energy Consumption Status 2022/23, (adapted from MoF, Economic Survey, 2080/81)

2 Water and Energy Commission Secretariat (WECS), 2017: Electricity Demand Forecast Report (2015-2040)

3 Ministry of Finance (2024): Economic Survey 2080/81 and WECS : Energy Sector Synopsis Report (2024)

Nepal's reliance on imported fuels has a significant impact on the country's economy. The large share of fossil fuels, for which Nepal has no reserves, necessitates high levels of imports. In FY 2022/23, around 17.3% of the total import was attributed to imports of diesel, petrol, and LPG only. Nepal imported 1,408,494 kL of Diesel, 680,807 kLof petrol and 514,346 metric tons of LPG.[4] This heavy reliance on imported fuels has placed Nepal in a precarious position, not only exacerbating the trade deficit but also rendering the country highly vulnerable to energy security risks. To bolster its economy and safeguard its sovereignty, Nepal must reduce its dependence on these imported fuels.

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%.

1.2.1 National Electrification Status Access

As of mid-March 2024, the percentage of the population with access to electricity has reached 97.7%[5]. Out of total electricity access 5.9 percent of population has access to electricity through renewable energy sources.Similarly, per-capita electricity consumption has increased to 400 kWh. Comparatively, total installed capacity has increased by 17.6% since the last fiscal year, now standing at 3,157 megawatts (MW). Out of this, hydroelectricity contributes 2,990MW, solar plants contribute106MW, sugarcane mills cogeneration produce

4 Department of Custom (DoC), 2023 : Annual Foreign Trade Statistics Book 2079-80

5 Ministry of Finance (2024): Economic Survey 2080/81

6 MW[6]. During the same fiscal year, 1,411 kilowatts (kW) of mini and micro hydropower, 390kWp from solarminigrid and 6,927 kWp from Solar Rooftop projects have been put into operation. Furthermore, 3,042 biogas plants and 8,306 solar home systems have been successfully installed.

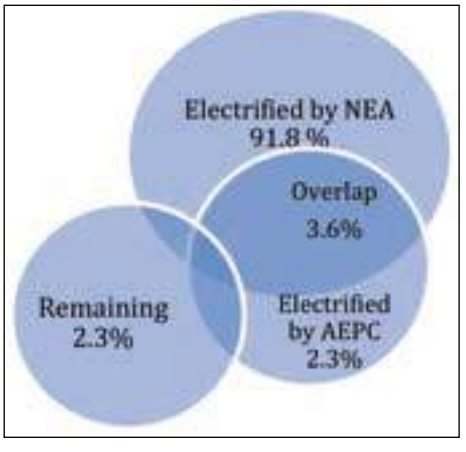


Figure 3: Electricity Access Data[7]

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 microhydro 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

6 Nepal Electricity Authority https://www.nea.org.np/annual_report

7 Ministry of Finance (2024): Economic Survey, 2080/81

energy technologies. Furthermore, the plan established the 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 onRE. 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)[8].

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.[9]

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 sources[10]. 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.

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

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

10 The Constitution of Nepal (2015)

Nationally Determined Contributions (NDC) (2016) of Nepal primarily emphasize the advancement of RE and EEas measures to address and mitigate the impacts of climate change.

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 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)[11] 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

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

minimize losses and damages associated with disasters.

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 500 large-scale biogas plants, thereby contributing to cleaner and more sustainable energy practices in the country. These targets collectively reflect Nepal's commitment to combating climate change through RE utilization.

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 objective of charting out pathways for reducing greenhouse gas emissions, ultimately leading to the achievement of net-zero carbon emissions by the year 2045. 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).

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. Additionally, it seeks to stimulate the engagement of the private and financial sectors in renewable energy investment by mitigating associated risks. 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 stakeholders and mobilizing financial resources to support the realization of its objectives.

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%).

Sixteenth Plan has been adopted by the GoN for a period formFY 2024/25to 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 2024seeks 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 strategy 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

Renewable Energy and Energy Efficiency Bill,after receiving approval from the Cabinet, the bill has been submitted to the National Assembly of the Federal Parliament and is under discussion. Once enacted, it will establish a solid legal and regulatory foundation to promote the growth of the RE and EE sectors in Nepal.

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 statue of the International Renewal Energy Agency (IRENA). Nepal became the 153rdnation to endorse the IRENA statute. In addition, Nepal has officially joined the International Solar Alliance (ISA) as its 101stfull 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.

First International Clean Energy Day organized by AEPC on 26 January 2024

CHAPTER 2

ALTERNATIVE ENERGY PROMOTION CENTRE

2.1 INTRODUCTION

The Government of Nepal recognized the valuable role of renewable energy technologies (RETs) in meeting the energy requirements of rural communities as far back as the 1980s, during the Seventh Five Year Plan. Since then, there has been a growing emphasis on promoting and advancing RETs by integrating them into various development plans and programs.

To facilitate this endeavor, the Government of Nepal established the Alternative Energy Promotion Centre (AEPC) on November 3, 1996. AEPC operates under the purview of the Ministry of Energy, Water Resources, and Irrigation (MoEWRI). It functions as a semi-autonomous government entity, overseen by the Alternative Energy Development Board (AEDB). The AEDB is composed of representatives from the government, private sector, non-governmental organizations, and financial institutions.

The AEPC's Board serves as the highest 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's responsibilities encompass the encouragement and advancement of various RE sources, including micro/mini hydro projects (up to 10 MW), solar energy, wind energy, biomass energy, biogas etc. Through the Seventh Amendment of the AEPC Formation Order 2053 (1996) in 2075 (2018), AEPC's role and functions have been expanded significantly. In addition to its responsibilities, AEPC has been entrusted with tasks related to enhancing energy efficiency, executing carbon-related initiatives, and collaborating with provincial and local governments to build their capacity in implementing projects focused on RE and EE.

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 Technology (RET) 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 the Public Private Partnership (PPP) Model and operates with a Demand-Based Approach. In this collaborative framework, the public sector is responsible for activities such as capacity building, technical and financial assistance, coordination, and quality assurance. On the other hand, the private sector plays a pivotal role in tasks like manufacturing, supply, installation, and providing after-sales services. AEPC has also played a key role in promoting RE and addressing climate change concerns at the decentralized level by establishing District Environment, Energy, and Climate Change Sections. Moreover, AEPC has achieved successful service delivery by partnering with NGOs at the national and regional levels. The engagement with the private sector extends to various aspects of renewable energy technology, including manufacturing, supply, installation, and post-installation services.

AEPC APPROACH FOR PROGRAM IMPLEMENTATION

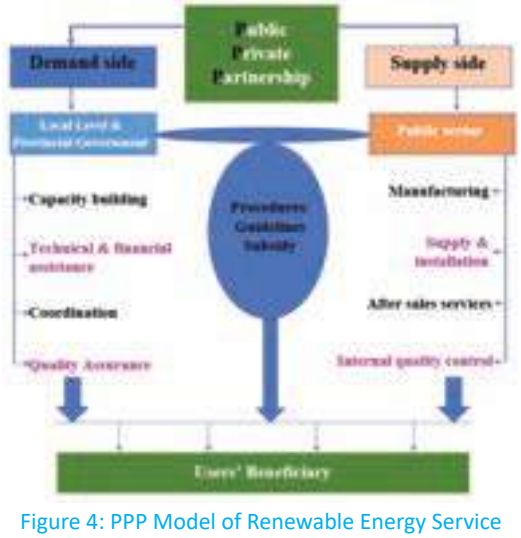


Figure 4: PPP Model of Renewable Energy Service Delivery

Since the enactment of the new constitution and the transition to a federal system of governance, AEPC has been actively focusing on collaborating with the provincial level across the 7 provinces and at the local level within the 753 local governments.

From the national to sub-national level, AEPC collaborates closely with relevant ministries, their respective departments, non-governmental organizations, the private sector, civil society organizations, national financial institutions, academia, and community/user groups to advance the development and promotion of RETs in Nepal. Over the course of 27 years of successful operation, AEPC has cultivated collaborative partnerships with a variety of External Development Partners (EDPs), intergovernmental organizations, multilateral banks, and other entities. Additionally, AEPC actively engages in accessing various international climate and carbon finances.

AEPC holds the distinction of being accredited as the Direct Access Entity of the Green Climate Fund (GCF) and has a signed funded activity agreement for the project titled "Mitigating GHG emissions through modern, efficient, and climate-friendly clean cooking solutions." Furthermore, AEPC serves as the delivery partner of the Ministry of Finance-the National Designated Authority (NDA) for GCF in implementing the GCF Readiness and Preparatory Support Program. AEPC consistently participates in the development of project concepts and proposals aimed at enhancing access to available international climate finance resources.

2.2.2 Promotion of Renewable Energy

Currently, AEPC is executing various initiatives and schemes aimed at advancing the adoption of the following renewable energy systems within the nation:

- Mini and Micro Hydropower,
- Improved Water Mill;
- Solar Photovoltaic and Solar Thermal;

- Bioenergy (Clean Cooking Technologies, ICS, Biogas, Waste to Energy)
- Wind Energy

Furthermore, AEPC has advocated for RETs through carbon projects, primarily focusing on the Clean Development Mechanism (CDM). Biogas, micro-hydro, improved water mills, and improved cookstoves have already been incorporated into the CDM portfolio. AEPC is progressively strategizing to introduce additional RETs into its carbon project portfolio in alignment with the Paris Agreement.

2.2.3 Collaboration with Provincial and Local Governments

The outreach function within the federal context plays a crucial role. This function at AEPC has effectively facilitated the signing of MoUs with the provincial ministries' looking after the energy portfolio in all seven provincial levels. It places a strong emphasis on building capacity and providing orientation on RE and EE at the provincial and local levels. Ultimately, it offers technical assistance to provincial and local authorities in the planning, development, implementation, and monitoring of RE and EE programmes.

To support provincial governments, AEPC is actively engaging for supporting the preparation of provincial energy plans and policies. For local government, AEPC has developed a methodology for creating Municipal Energy Plans (MEPs), in collaboration with municipalities and development partners. These MEPs are designed to ensure universal access to clean cooking and lighting solutions by 2030, energy for community services like health centers and schools, and support for enterprises. The methodology aids in identifying the most cost-effective solutions for specific energy services, considering the life cycle cost of various energy options, including grid extension, mini/micro hydro, solar PV/thermal, biogas, and biomass. MEPs have also incorporated the EE measures based on the needs of the respective local levels

2.2.4 Promotion of Productive Energy Use

Promoting productive energy use (PEU) aims to transform the provision of RE into positive economic outcomes for Micro, Small, and Medium Enterprises (MSMEs). These favorable outcomes, such as increased product outputs, enhanced product quality, and improved productivity, lead to income growth for MSMEs and contribute to entrepreneurship and poverty reduction in rural areas of Nepal. Consequently, AEPC strives to encourage the productive use of RE, creating employment opportunities and income for both rural men and women by establishing MSMEs.

For the sustainability of any RE project, productive energy use plays a crucial role in boosting the income of local residents and creating new job opportunities in the vicinity of the RE project area. This, in turn, enhances people's capacity to afford and invest in RE systems. Furthermore, the energy systems that provide power to the productive component benefit from increased load factors, ensuring their long-term sustainability. In this way, the RE systems and productive energy use complement each other.

2.2.5 Financing Instruments and Mechanism

AEPC's primary focus has revolved around the administration of subsidies for various RETs. The Central Renewable Energy Fund (CREF) was established as AEPC's financial mechanism to

fund RETs. The fundamental guiding principle behind the creation of CREF was the gradual phasing out of subsidies for promoting RETs, to be replaced by credit facilities managed by the private sector. CREF, as the core financial mechanism, is primarily responsible for effectively delivering subsidies, viability gap funding and credits to the RE sector.

The financial management mechanism of CREF is implemented through commercial and development banks chosen through a transparent and competitive selection process, based on well-defined eligibility criteria. The Handling Bank – class A commercial bank - takes on critical roles, including wholesale lending to qualified Partner Banks, managing the subsidy and viability gapfunding, and handling Investment Management. Several qualified Partner Banks, operating as second-tier financial institutions, are responsible for disbursing CREF funds to eligible projects in the RE sector. To expand their reach, these banks are required to establish strategic partnerships with local financial institutions (LFIs). The selected banks assume credit risks, which are reflected in the interest spreads, and they are also in charge of loan appraisal and supervision. CREF, facilitated by the Secretariat, supports the banks with capacity building to enhance outreach, efficiency, infrastructure, and the stability of financial systems for lending to the renewable energy sector. Currently, Viability Gap Funding (VGF) support under Sustainable Energy Challenge Fund (SECF) is also being implemented through CREF with the support from various development partners and GoN.

2.2.6 Compliance and Ethics

AEPC has established Compliance Unit in its organization based on the decision made by the Board on 04/01/2016 AD (20/09/2072 BS). This unit serves the purpose of overseeing and ensuring the effectiveness of internal controls at the institutional level. The oversight responsibilities of this unit are overseen by a sub-committee called the "Compliance and Ethics Sub-committee," consisting of five members coordinated by one of the board members of AEPC. The Compliance Unit, operating through this sub-committee, provides regular reports directly to the Board, highlighting areas where improvements are needed to ensure the proper functioning of internal controls. AEPC has further established Internal Control Committee and Grievance Handling Committee ensuring a robust integrity mechanism within the organization.

2.2.7 Environmental and Social Safeguards

AEPC has implemented the Environmental and Social Safeguards (ESS) Policy in accordance with Nepal's Environment Act and Environment Protection Rules. This policy is designed to minimize environmental and social impacts as much as possible by employing suitable mitigation measures. The primary principle outlined in this policy is to prevent, decrease and alleviate any adverse effects on the environment and society by integrating environmental and social considerations as an integral part of AEPC's project lifecycle.

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 actively providing RE and energy EE services to its intended beneficiaries. AEPC has consistently played a leading role in assisting the government in crafting essential policies, strategies and plans needed to integrate RE into Nepal's mainstream energy supply and adopting EE at various sectors. Additionally, it has played a pivotal role 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 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
- Second Nationally Determined Contributions (NDC), 2020
- 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
- NDC Implementation Plan, 2023
- Renewable Energy and Energy Efficiency Bill, 2023
- Green Hydrogen Policy, 2024

2.5 CUMULATIVE ACHIEVEMENTS

AEPC has actively advocated for RE adoption, encompassing various technological solutions in both rural and urban settings. Over its 28-year history, AEPC has assisted more than 14 million individuals (note that a single beneficiary may have been counted multipletimes, depending on the number of different RE technologies they received) throughout the nation in meeting their energy needs. This support has been made possible through the strategic provision of technical assistance, subsidies, viability gap funding and credit financing. The table below outlines the cumulative quantity of RE technologies promoted

by AEPC till the end of FY 2023/24

Table 1: Cumulative achievement in technology promotion

S. N.	Program	Unit	Achievement Up to FY 2023/24
1.	Micro/Mini Hydro	kW	40,253
2.	Improved Water Mill (IWM)	Nos.	11,104
3.	Solar Mini grid Solar/ Wind Min-grid System	kWp	3097
4.	Solar Rooftop	kWp	18,293
5.	Solar Home System	Nos.	996,647
6.	Institutional Solar PV System	Nos.	4,332
7.	Solar Drinking Water and Irrigation Pump	Nos.	3,691
8.	Solar installed at religious place and homestay	Nos.	4,758
9.	Solar street lights	Nos.	3,309
10.	Solar Dryer and cooker	Nos.	2,464
11.	Domestic Biogas	Nos.	450,770
12.	Institutional, Urban and Commercial Biogas Plant	Nos.	369
13.	Mud Improved Cookstoves	Nos.	1,423,242
14.	Portable Metallic Stoves	Nos.	132,211
15.	Electric Stove	Nos.	59,385
16.	Institutional Gasifier	Nos.	33
17.	Productive End Use	Nos.	1,766

AEPC has consistently upheld its commitment to providing RE services to the populace, fostering enduring partnerships with crucial Development Partners (DPs). AEPC's dedication and achievements have earned it numerous accolades and honors. The sector has experienced significant competitiveness, with approximately 500 private companies generating both direct and indirect employment for over 40,000 individuals. This development has given rise to a thriving renewable energy market, which has effectively permeated every corner of the country. Additionally, market developmentfor EE is gradually coming up.

Dissemination of Clean Cooking Solutions with support from AEPC/ NREP

CHAPTER 3

PROGRAMS AND PROJECTS

AEPC has been carrying out a range of programs and projects in collaboration with development partners, and it has also independently executed specific programs funded solely by the Government of Nepal's budget. This section provides an overview of the diverse programs, projects, and specific initiatives that AEPC has undertaken during the reporting period.

3.1 SPECIAL AND TARGETED RE AND EE PROGRAMME

During the reporting period, AEPC effectively executed its routine RE development and EE promotion endeavors using government funds. AEPC efficiently carried out programs aimed at delivering renewable energy services, including micro/mini hydropower, solar, bioenergy, and biogas, to remote rural communities, with special emphasis on women, marginalized populations, and disadvantaged groups. Specific targeted initiatives encompassed smoke-free households, energy provision for healthcare and education, support for irrigation and agriculture, energy for the tourism sector, the development of biogas pipelines and bottling facilities, and the provision of renewable energy services to local communities, religious institutions, schools, hospitals, and public organizations. Additionally, AEPC conducted activities related to promotion and adoption of EE enhancing productive energy utilization, capacity building, quality assurance, gender and social inclusion, carbon management, and climate change throughout this period.

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 Viability

Gap Funding (VGF) has been added to the mandate of CREF with the incorporation of Sustainable Energy Challenge Fund (SECF) with CREF in 2021.

The GoN has sustained the NRREP using its own resources and with the participation of other development partners. Additionally, the Central Renewable Energy Fund (CREF), established as a financial intermediary mechanism to mobilize subsidies and credits for renewable energy through a network of banking and financial institutions, has also continued its operations.

3.3 MAJOR PROGRAMS/PROJECTS IMPLEMENTED UNDER NRREP

3.3.1 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 ofMunicipal 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).

3.3.3 Renewable Energy and Energy Efficiency Programme

The Deutsche Gesellschaft für InternationaleZusammenarbeit (GIZ) GmbH is providing support for the Renewable Energy and Energy Efficiency Programme (REEEP), which is a technical cooperation project established through an agreement between the Government of Nepal (GoN) and the Federal Republic of Germany. With GIZ acting on behalf of the German Federal Ministry of Economic Cooperation and Development (BMZ), the execution of REEEP falls under the responsibility of the MoEWRI. The primary goal of REEEP 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 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

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 Hydro 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 Micro Hydro Projects. 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 NRs. 234,338,583.07 as a grant from KFW.

AEPC has invested Biogas Loan to financial institutions NRs. 511,935,557 to their client living in rural areas to install biogas plants and has recovered the loan of NRs. 400,137,370 as revolving fund. Total of 44,001 biogas plants have been installed through Biogas Loan Programme in all the 7 provinces by more than 348 financial institutions. AEPC has paid NRs. 182,150,647.33 to the Ministry of Finance. The financial institutionshave submitted biogas loan demand application of NRs. 387,094,295 for constructing 14,380 biogas plants.

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

3.3.6 Nepal Renewable Energy Program

The 3.3.6 Nepal Renewable Energy Program (NREP) is a program spanning four and a half years, with a total budget of £9.2 million, funded by UKAid as part of the Climate Smart Development for Nepal initiative. The MoF and the DFID (now FCDO) signed the program in 2017. Out of the total UKAid funding of 18M 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 is being implemented collaboratively by DAI Europe and Winrock International, in partnership with AEPC.NREP is 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 provincial offices, the MoEWRI, Ministry of Physical Infrastructure and Development (MoPID) at the provincial level, Nepal Electricity Authority (NEA), and more.
2. Strengthen the capacity of the Central Renewable Energy Fund (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.

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 Government of Nepal 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).

1. Renewable energy mini-grid initiatives eligible for participation in the (MGEAP) encompass the following categories:
2. Greenfield mini-grid initiatives: These encompass subprojects with a total capacity of 2.8 MW.
3. 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 Scaling up Renewable Energy Programme (SREP)-Extended Biogas Project hasbeen taken over by 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, 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 for 3.5 years. There are three target components of the project i.e. On-grid component which includes Solar Rooftop with 15 MW target, Decentralized Renewable Energy (DRE) with target of 1 MW piloting, Off-grid component which includes Solar Irrigation Pump (SIP) with 224 nos. (600 kWp) target,400kWp (10 nos.) Solar Mini-grid Project and Capacity Building activities.

The Project is being implemented by the Project Implementation Unit (PIU) established by AEPC. The PIU has been implementing the project with the support from Tractebel Engineering GmbH as Project Implementation Consultant (PIC). The PIU is responsible to implement the subprojects including the accompanying measures at the national and sub-national level.

3.3.9 Mobilizing Climate Finance - Green Climate Fund (GCF)

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 supportdeveloping 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 (USD 10 million to 50 million) 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

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

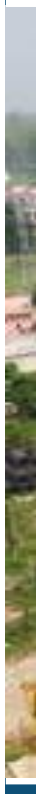
To promote the Clean Cooking Solutions in Nepal's Terai region, the project was approved with thetotal budget of USD 49.2 million that includes USD 21.12 million grant from the GCF, USD 20.95 million co-financing from the GoN and USD 7.06 million co-financing from the Local Level. Activities will include 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.

3.3.9.2 GCF Readiness and Preparatory Support Program

AEPC was nominated by the Ministry of Finance (MoF) as the delivery partner to implement the GCF Readiness and Preparatory Support Program. TheGCF Secretariat approved Readiness Proposal initially submitted on 2 November 2020, with the AEPC as the Delivery Partner. The proposal was approved on 7 September 2021 for the amount of USD 700,193 for "Readiness support for enhancing the capacity of NDA and other stakeholders for project pipeline development in Nepal." The project is under implementation since July 2022.In addition, AEPC proposal on the GCF Readiness New Funding Window for Integrated Results Management Framework has been approved amounting to approximately 0.2 million USD. In FY 2023/24, MoF approved AEPC's request to become the delivery partner of Multi Year GCF Readiness Project for 2024-2027 period. Proposal template and other detail are yet to be released by GCF for the period and AEPC is actively working with GCF for developing this multi-year readiness project. There are also other opportunities for AEPC to access the readiness fund under different funding windows of GCF in the future.

3.3.10 Collaborative Partners

Furthermore, AEPC is actively collaborating with organizations such as ICIMOD, IWMI, GGGI, USAID Urja Nepal, Renewable World, WePOWER, and Clean Cooking Alliance on various initiatives aimed at promoting renewable energy, energy efficiency, and climate and carbon financing in Nepal. These partnerships are focused on implementing innovative interventions that enhance access to clean energy, optimize energy use, and reduce carbon emissions. Through joint efforts, AEPC and its partners are working to strengthen Nepal's energy infrastructure, improve resilience to climate change, and contribute to the global transition toward sustainable energy solutions. These collaborative efforts are also facilitating carbon financing mechanisms, enabling the mobilization of resources for cleaner energy projects and fostering regional cooperation for broader climate action.



Solar Rooftop with capacity 633.6 kWp installed in Hama Iron and Steel Industries Simara, Bara with support from AEPC/KFW-DKTI Solar Project

CHAPTER 4

PROGRESS OVERVIEW

In the fiscal year 2023/24, AEPC implemented RE and EE initiatives using two distinct approaches: the first involved the targeted RE and EE program under the name of organization itself, i.e., Alternative Energy Promotion Centre (AEPC) , funded exclusively by the Government of Nepal (GoN); the second was the National Rural and Renewable Energy Program (NRREP), jointly financed by the GoN and other development partners (DPs). During the reporting period of 2023/24, projects carried out under the targeted renewable energy program achieved 86% of their physical goals and 84% of their financial targets. Likewise, in the case of NRREP, the physical progress reached 81%, and the financial progress reached 78%.

Table 2: Annual progress of AEPC implemented programs

SN	Programs	Progress	%
2023/24			
1	AEPC	Physical	86 %
		Financial	84 %
2	NRREP	Physical	81 %
		Financial	78 %

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 2023/24, the Government of Nepal (GoN) allocated approximately 54% 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 40% in the form of grants and 6% as loans.

In the fiscal year 2023/24, AEPC received a total budget of NPR 1,764.4 million for both of its program routes, out of which it disbursed NPR 1,407 million. The overall financial achievement for AEPC in the fiscal year 2023/24, covering both programs, reached 80%. Specifically, the financial progress for the targeted RE and EE program implemented by AEPC during this period was at 84%, while the progress under the NRREP reached approximately 78%.

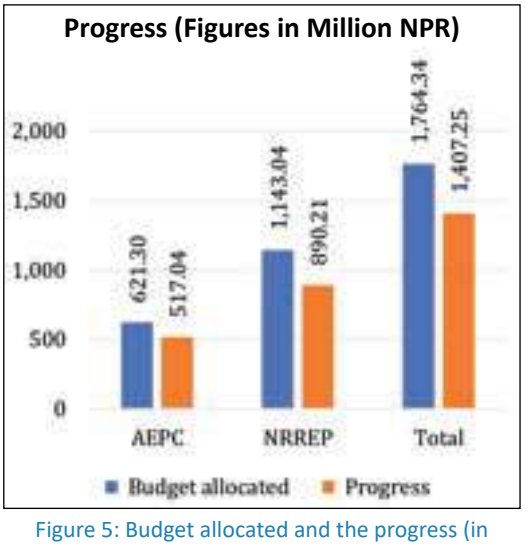


Figure 5: Budget allocated and the progress (in million NPR) (FY 2023/24)

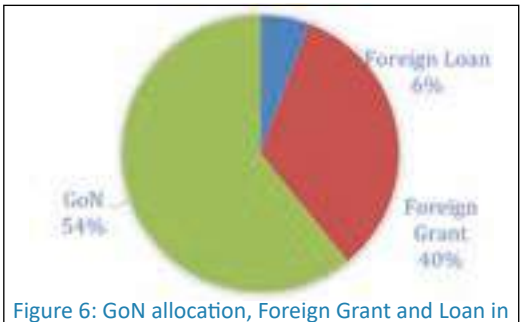


Figure 6: GoN allocation, Foreign Grant and Loan in total RE budget in 2023/24

4.2 PHYSICAL PROGRESS

The details of the progress made in terms of physical accomplishments during the specified time frame are provided in section 4.1. 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 work plan for the fiscal year 2023/24 aimed to install 300 kW Mini/ Micro hydrothrough GoN initiatives and an additional 1500 kW installations as part of the SASEC program. During the reporting period, a total of 1,312 kW of Pico/Mini/Micro hydro was installed through these initiatives. Notably, the Pico/Mini/Micro hydro component achieved 105 % of its target under the GoN regular budget, while the Micro hydro installation under the SASEC program reached a commendable 67% of its intended goal. In addition, 7 micro hydro projects have been successfully repaired and 3 micro hydro operated lift irrigation systems have been installed under the productive energy use during 2023/24. There were no activities in for the IWM in reporting period.

Figure 7:Headworks of Lower Bom Mini Hydro, Solukhumbhu

Figure 8: Turbine of Middle Fawa Mini Hydro, Taplejung

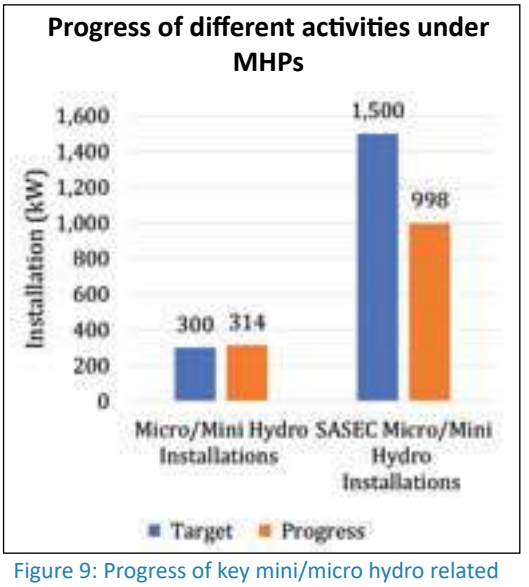


Figure 9: Progress of key mini/micro hydro related activities

4.2.2 Solar Energy Related Activities

Nepal is well-positioned to harness RE, particularly solar power, due to its geographical advantage. Located within the sunbelt region between 26°N to 30°N latitude, Nepal experiences approximately 300 days of sunshine annually, making it a prime location for solar energy development. The country receives solar radiation ranging from 3.6 to 6.2 kWh/m² per day, with an average of 4.66 kWh/m² per day.

The AEPC has played a pivotal role in promoting solar energy technologies,

contributing significantly to addressing energy poverty in Nepal. During the 2023/24period, AEPC achieved remarkable progress in implementing solar energy initiatives. These initiatives represent a crucial step towards sustainable energy solutions, improving access to clean energy, and enhancing the socio-economic development of the nation. Among the key achievements:

A) Solar Pumping Systems

The installation of solar pumping systems for irrigation to support commercial agriculture surpassed the intended target of 200 systems, achieving 202 installations (101% progress). Under the DKTI/ KfWprogramme, 124 solar drinking water and irrigation systems were completed out of the 100 targeted (124% progress).

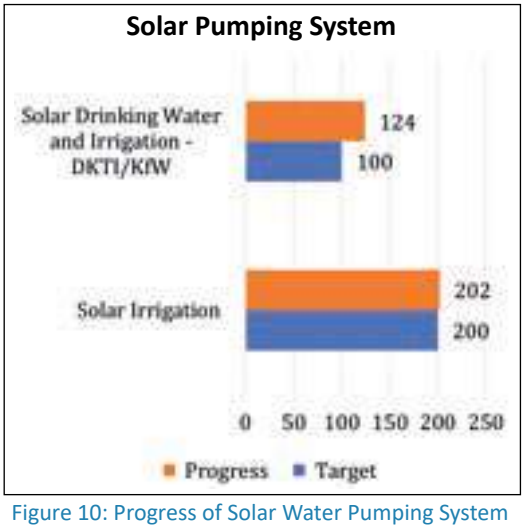


Figure 10: Progress of Solar Water Pumping System

Figure 11: Solar Irrigation Pump

B) Solar Mini grid projects

AEPC achieved significant progress in the solar mini-grid system during the 2023/24 period. A total of 16 detailed feasibility studies for solar mini-grids were completed, exceeding the target of 10 (160% progress). Under the Solar Mini-grid for Ujyalyo Nepal initiative, electricity generation from the mini-grid program reached 390 kWp out of the 700 kWp target (55.7% progress), with an additional 293 kWp currently under construction. Similarly, under the AEPC/KfW- DKTI Solarprogramme, 523 kWp of solar mini-grid projects are under development, reflecting the ongoing efforts to expand clean energy access and strengthen Nepal's renewable energy infrastructure.

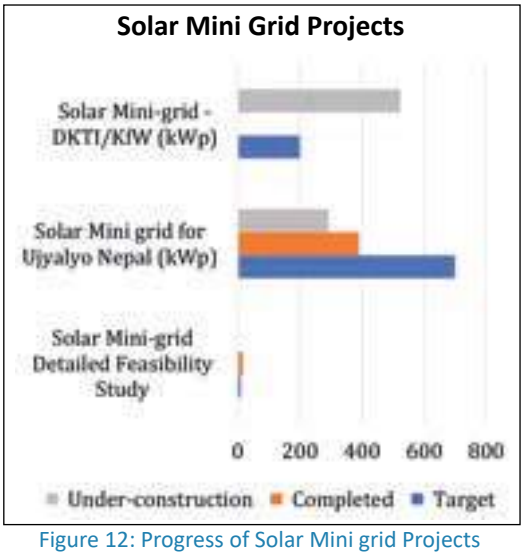


Figure 12: Progress of Solar Mini grid Projects

C) Institutional Solar PV System, Solar Rooftop System and Solar Home System

Regarding the installation of Institutional Solar Photovoltaic Systems (ISPS) and Solar Rooftop Systems for various institutions, 2,622 kWp were installed, surpassing the target of 2,000 kWp (131% progress). Furthermore, 147 solar PV light systems were installed in community, public, and religious places, nearly reaching the target of 150 (98% progress). For Solar Home Systems in un-electrified areas,

the project achieved 119% progress, reaching 8,906 households compared to the target of 7,000.

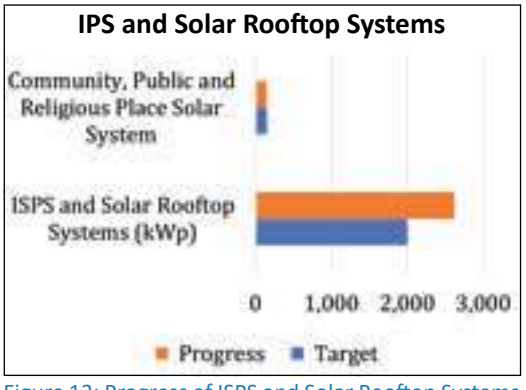


Figure 13: Progress of ISPS and Solar Rooftop Systems

Figure 14: 1 kWp Institutional Solar PV System (ISPS)

4.2.3 Bioenergy

In terms of the community and institutional biogas plant installation, out of targeted10 community and institutional biogas plants, 12 plants were successfully installed, exceeding the target set for the period. Under NRREP, access to clean energy with Household Biogas Installation achieved 29% progress with only 1,432 installations out of 5,000 target due to lack of adequate budget.

Clean energy program replacement of dung cakes and agricultural residue had targeted 17,500 installation of Electric Cookstovesand all of the installations were successfully completed. In addition, through the SECF, over 30,000 families were enabled to switch from traditional cooking to induction cooktops.Similarly, out of targets of 2500 installations for tier 3 improved cookstoves and rocket stoves installation at institutional and household level, the target was overachieved with the total installation of 2508 tier 3 cookstoves. In addition, 2000 MICS have been installed in hilly and mountainous region. Furthermore, with the utilization of carbon fund, 1610 domestic biogas plants have been installed for targeted beneficiaries.

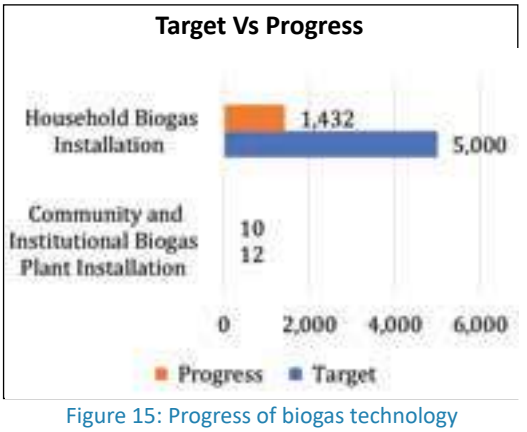


Figure 15: Progress of biogas technology

Figure 16: Domestic Biogas Plant installation

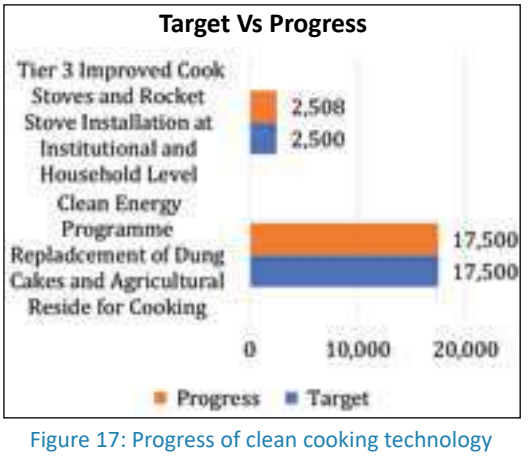


Figure 17: Progress of clean cooking technology

Figure 18: Tier 3 Stove installation with support from AEPC/ NREP

Figure 19: Electric Cookstove installation with support from AEPC/ NREP

4.2.4 Energy Efficiency

A) Dissemination of Energy-Efficient Fans

In the fiscal year 2023/24, AEPC successfully disseminated 1,061 energy-efficient fans to 77 public schools located in 36 districts. This initiative underscores dedication to enhancing EE within public infrastructure along with reducing the number of school closure days due to high temperature in the region. Additionally, it serves as a valuable opportunity to educate communities on the advantages of using energy-efficient appliances, thereby promoting sustainable practices and raising awareness about energy conservation.

B) Energy Efficiency Standards for HouseholdAppliances

AEPC has been partnering national standard body and sector partners for developingenergy efficiency standards for a range of household appliances, including electric fans, refrigerators, air conditioners, induction motors, solar water heaters, electric geysers, LEDs, and induction cooktops. These standards aim to discourage the sub-standard appliance and enhance the EE of appliances used in Nepal, ultimately leading to significant energy savings and reduced costs for consumers thereby contributing towards energy security for the nation. The initiative is coordinated with the Nepal Bureau of Standards and Metrology (NBSM) and supported by USAID-Urja Nepal, which are providing ongoing assistance for the establishment of standards and labeling for efficient appliances.

C) Energy Audit of Public and private institution, industries and commercial buildings

Till now AEPC has successfully completed energy audits in 41 public and private institutions, encompassing a variety of sectors such as dairy, finance, healthcare, steel, education, brick manufacturing, and hospitality. In FY 2023/24, energy audits wereconducted at three organizations: Nepal Bank Limited (NBL), United Cable and Wire Pvt.Ltd., and Gorakha Departmental Store. These audits not only identify opportunities for energy savings but also serve as a platform for raising awareness about EE among stakeholders.

Figure 20: Preliminary meeting for Energy Audit in NBL

D) Operational Online Support System

AEPC has successfully implemented an online system for the Energy Efficiency Support Center, which includes mobile apps, EE Helpdesk and various online resources. This system effectively addresses inquiries and challenges related to RE and EE for industries and organizations. By providing accessible information and support, the platform significantly enhance suserengagement and facilitates the adoption of RE and EE across the sector.

e) Capacity Building and Legal Framework for Energy Efficiency

AEPC is dedicated to advancing capacity-building initiatives that foster experience sharing, consultation, and knowledge management among partner organizations in the field of RE and EE. These efforts align with the long-term objectives of the National Energy Efficiency Strategy (2075) by encouraging collaboration in developing essential legal frameworks for EE and conservation, as well as securing necessary resources. A workshop titled "Co-operation, Planning, and Implementation Prospects of Energy Efficiency Activities with Stakeholders" brought together representatives from ministries and departments, education and research institutions, development partners and programs, financial institutions, the private sector, and media with an aim to form EE-Network and create a volunteer market of EE to some extent. This gathering enriched participants understanding of EE and laid the groundwork for future collaboration. The insights and commitments made during the workshop are expected to significantly enhance EE practices across Nepal in the years ahead.

Figure 21: Workshop with different Stakeholders, Godawari

4.2.5 Outreach Management

The primary aim of outreach is to facilitate the expansion of RE and EE through effective and cooperative engagement with local and provincial government authorities, various government departments, national and provincial service delivery entities, private sector actors, other pertinent programs and projects, organizations, and relevant stakeholders. This entails working together and aligning efforts to strategically support the extension of RE accessibility to the intended beneficiaries through local and provincial governments, based on their established legal authority, as well as through national and provincial service providers. Outreach leverages existing institutional connections to improve the well-being of off-grid communities through the provision of RE services. In this context, key elements of successful coordination include ownership, harmonization, synergy, result-based monitoring, and alignment, while establishing a collaborative environment requires a clear delineation of roles and responsibilities for all stakeholders.

In FY 2023/24. a two-day training session for technical officers from local governments in Bagmati and Gandaki

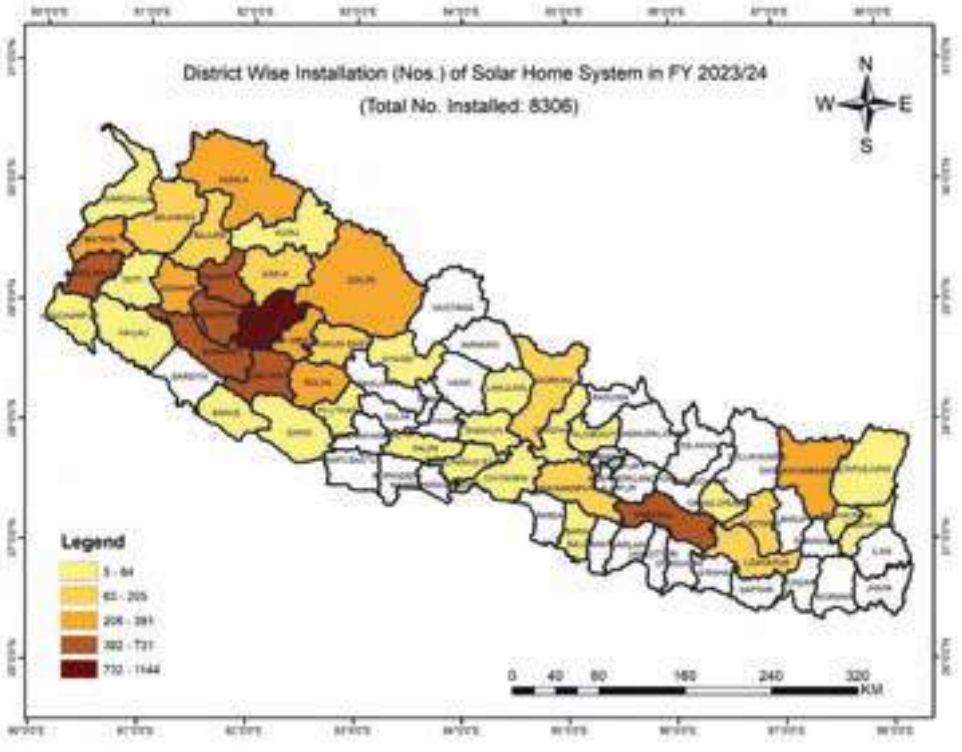
province was conducted, with the technical support of Building Energy Efficiency Nepal (BEEN) project. The training's aim was to equip these officers with essential skills related to RE and EEin building construction, while also encouraging knowledge sharing and discussions.

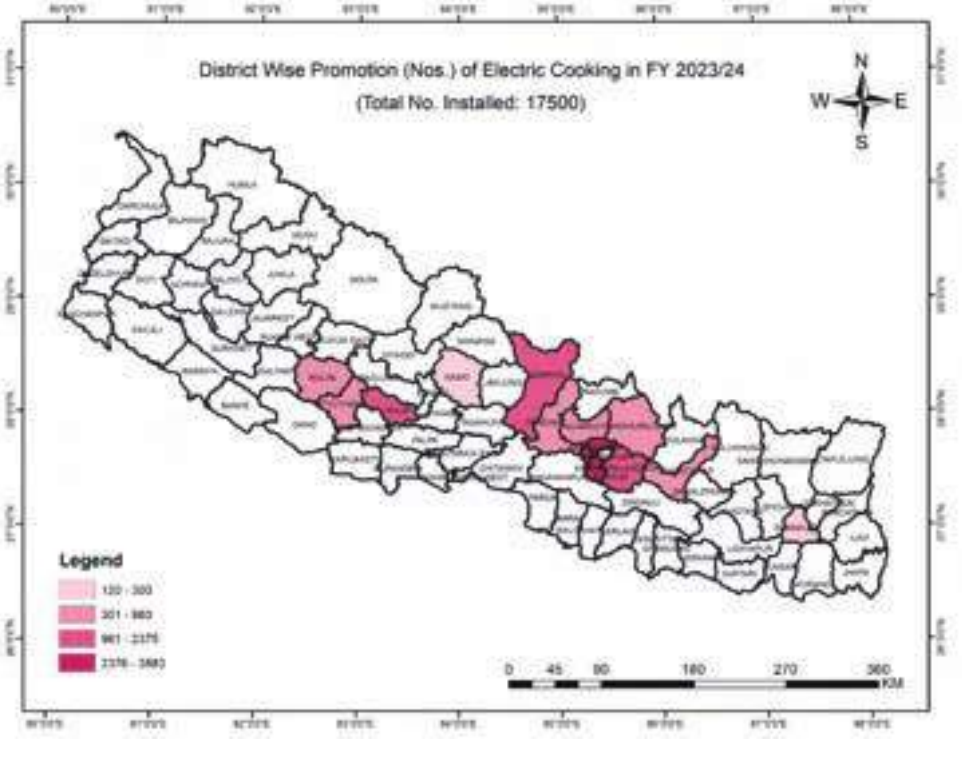
Figure 22: Capacity building training, Dhulikhel

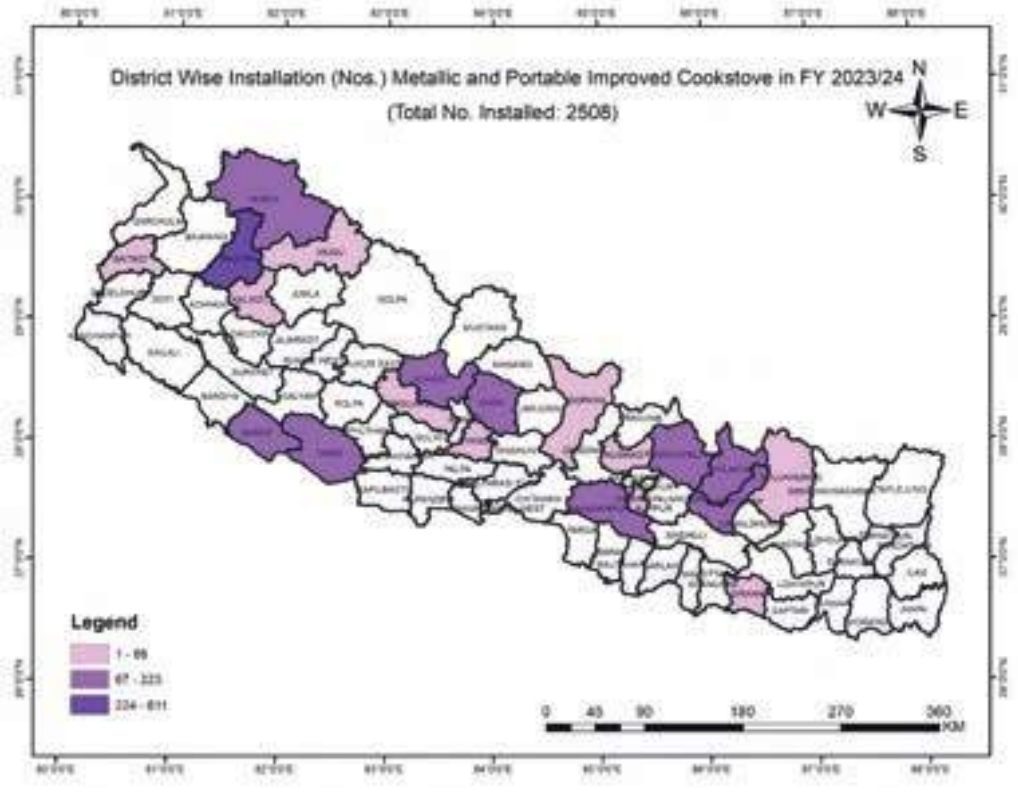
Figure 23: Capacity building training, Pokhara

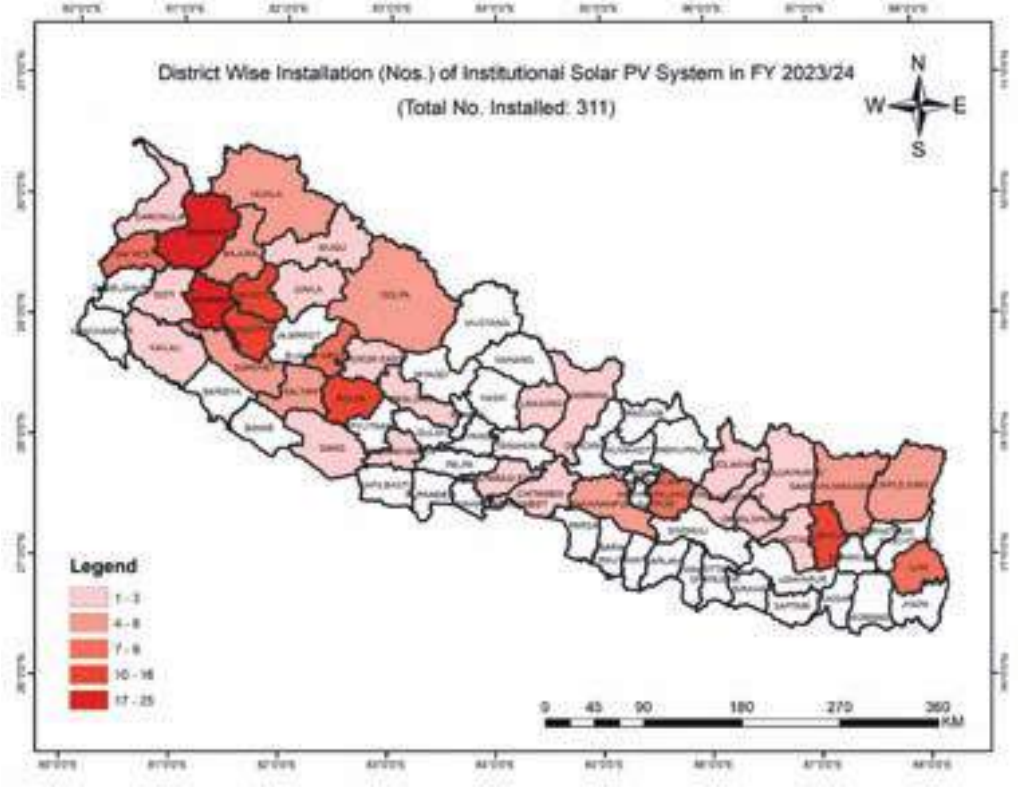
Participants emphasized the importance of adapting this knowledge to create energy-efficient buildings and expressed a strong desire for more local policy support. The participants also expressed interest in having more in-depth technical training sessions focused on these topics in the near future.

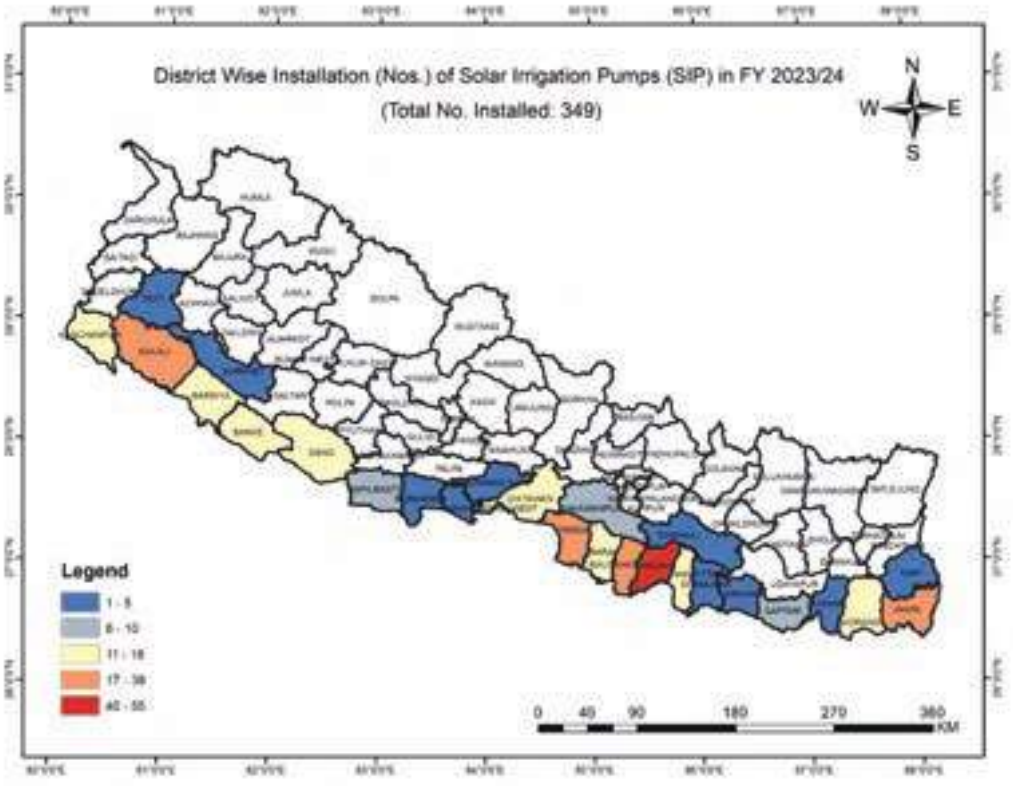
4.3 DISTRICT WISE GIS MAPS OF RENEWABLE ENERGY TECHNOLOGIES

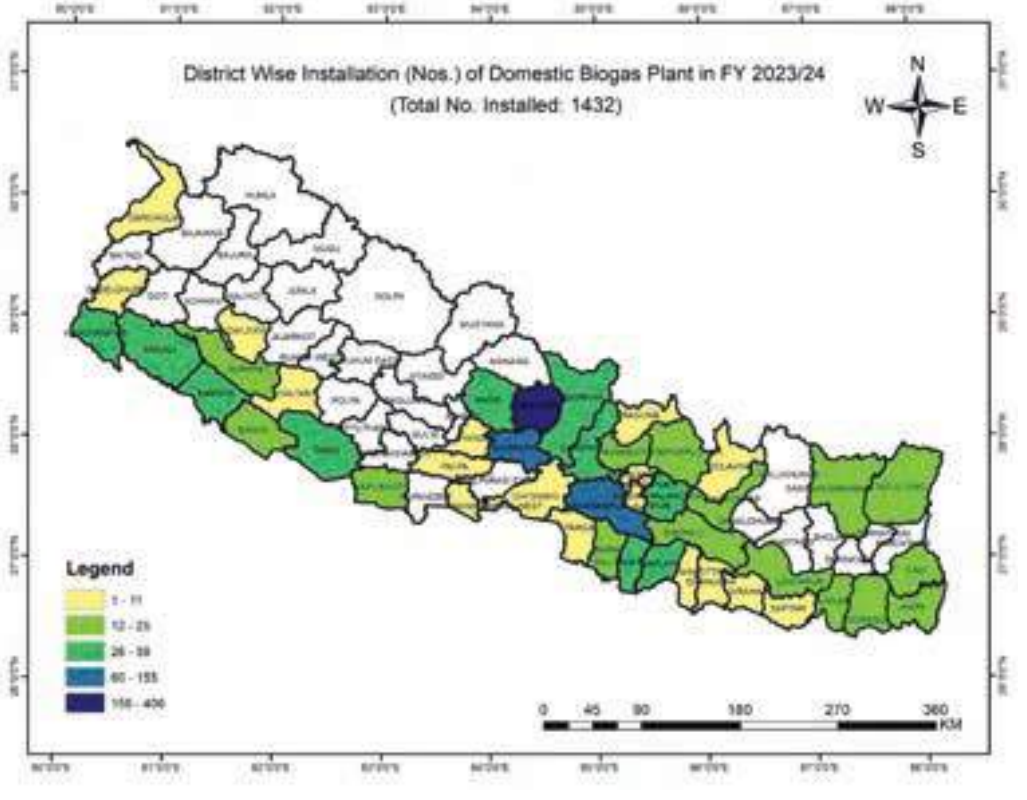





District Wise Installation (Nos.) Metallic and Portable Improved Cookstove in FY 2023/24
(Total No. Installed: 2508)
N
W
E
S
Legend
1 - 66
67 - 223
224 - 611
0 45 90 180 270 360
KM


District Wise Installation (Nos.) of Institutional Solar PV System in FY 2023/24
(Total No. Installed: 311)
N
W
E
S
Legend
1 - 3
4 - 6
7 - 9
10 - 16
17 - 25
0 45 90 180 270 360
KM


District Wise Installation (Nos.) of Solar Irrigation Pumps (SIP) in FY 2023/24
(Total No. Installed: 349)
N
W
E
S
Legend
1 - 5
6 - 10
11 - 16
17 - 39
40 - 55
0 45 90 180 270 360
KM


District Wise Installation (Nos.) of Domestic Biogas Plant in FY 2023/24
(Total No. Installed: 1432)
N
W
E
S
Legend
1 - 11
12 - 25
26 - 59
60 - 155
156 - 406
0 45 90 180 270 360
KM

NA Village Solar Mini grid – 30kWp, Gaurishankhar Rural Municipality, Ward no-9, Dolakha District

CHAPTER 5

PROGRESS OF CROSS CUTTING ACTIVITIES

5.1 CARBON FINANCING ACTIVITIES

AEPC is a pioneer government organization of the country to initiate the carbon finance with the registration of first two carbon projects of Nepal under Clean Development Mechanism (CDM) Registry immediately after the enforcement of Kyoto protocol. In 2010, the establishment of the Climate and Carbon Unit (CCU) marked the beginning, and in 2020, it evolved into the Climate and Carbon Section (CCS) as per the decision of the AEPC Board. This transformation aimed to improve the coordination of climate change-related efforts within AEPC. The CCS has been instrumental in coordinating carbon financing, accessing international climate funds, and spearheading numerous initiatives for both climate change mitigation and adaptation 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 implementingorganizations.
- 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 Readiness and Preparatory Support Programme.

5.1.1 Carbon Projects

AEPC holds eight CDM projects and program of activities (PoA) (Of which five biogas projects are in Gold Standard Registry also) which contribute as its regular source of revenue. Till date, around 5.94 million units of Emission Reduction (ER) has been generated and additional 542,866 ERs verification is under Gold Standard Registry Review (Total 6.5 million units of Emission Reductions); and around 6.48 million units of ERs have been sold. The total

earning from carbon revenue is around 35.27 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 118thmeeting, 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.

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 Gold Standard biogas project of fiscal year 2023/24 is ongoing and is estimated to generate 542,866 ERs, 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 (PoA DD) is prepared for the article 6.2 of Paris Agreement with the support from Global Green Growth Institute (GGGI). This project is waiting for the approval from focal ministry i.e. Ministry of Forests and Environment(MoFE), to move ahead.

In terms of new voluntary carbon project, 10,478 fuel efficient tier 3 cookstoves were distributed in 6local governmentsof 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 'EcozoneImproved Cooking Stove Projectin Nepal', AEPC has registered the project in VERRA registry, a voluntary carbon market. We anticipate an average of 44,044 tons of CO2 equivalent emissions reduction annually from this project.

Figure 24: Signing of contract between AEPC and six municipalities of Karnali and Sudurpaschim province for carbon trading

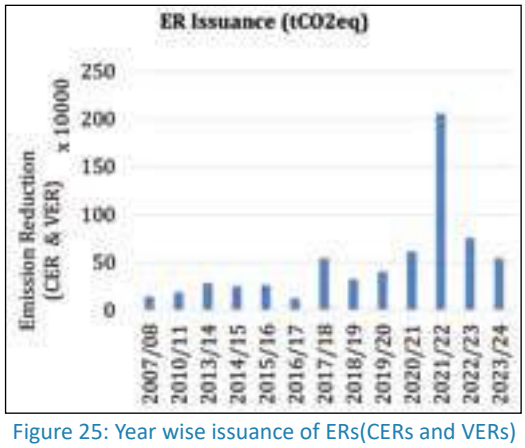


Figure 25: Year wise issuance of ERs(CERs and VERs)

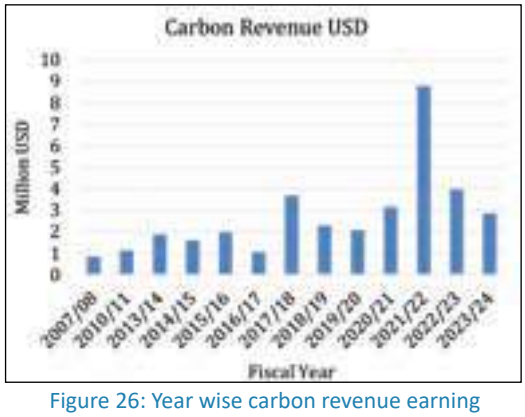


Figure 26: Year wise carbon revenue earning

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 Designated Operational Entity (DOE). The Crediting Period Renewal of Biogas CPA 8 and inclusion of CPA 11 in Biogas PoA for the CDM registry is completed by the DoE but the review of the CPA 8 and CPA 11 are ongoing under the Gold Standard Registry.

5.2 GENDER EQUALITY AND SOCIAL INCLUSION

Gender Equality and Social Inclusion (GESI) activities are integrated into all technologies and are spearheaded by the GESI Section at AEPC. Various initiatives have been carried out in the realm of GESI, with a focus on boosting the utilization of RE systems in off-grid areas. These efforts encompass:

- Training women in the construction and operation of mini-grid systems and preparing them to serve as customer service providers.
- Augmenting the involvement of women and marginalized groups in project development.
- Establishing micro-enterprises led by women.
- Conducting training programs in GESI-based community participation and the management of energy systems.

5.3 ENVIRONMENT AND SOCIAL SAFEGUARDS

To ensure the efficient implementation of the Environmental and Social Safeguard (ESS) Policy adopted by AEPC, a dedicated Environment and Social Safeguard Section has been created. Staff members are assigned to this section with the aim of harmonizing and standardizing environmental and social safeguard measures across all the technologies endorsed and supported by the organization. ESS matters are addressed on a per-project basis, as necessitated by the specific project documents and in 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 AEPChas 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 CAPACITY BUILDING

AEPC continued the capacity development activities of its partner

organizations, users groupand other sectorial actors during the reporting period. In the reporting period various trainings were conducted on RE and EE technologies, climate finance, technical support to provincial and local level, among others.

In November 2023, AEPC with support from KFW organized Project Completion and Learning Sharing Workshop of KFW supported project entitled "Promotion of Energy Efficiency and Renewable Energies Component 2: Promotion of Solar Energy". This innovative endeavor ushered in a wave of transformative change across the nation, focusing on strategic sectors that enhance the lives of communities and promote sustainable development. The project contributed for the promotion of Rural Solar Drinking Water Project (RSDWP) and Institutional Solar Photovoltaic System (ISPS). The large scaled demonstration pilot RSDWP projects implemented by the programme has laid foundation for policy intervention of 90% subsidy for Solar Drinking Water Project.

AEPC with support from ICIMOD initiated PURE (Productive Use of Renewable Energy) platform to identify potential sites for promotion RETs. This platform integrated the data layers to assess the energy demand potential for renewable energy powered irrigation with valuable insights, estimating the potential demand for renewable energy. Furthermore, a Detailed Feasibility Study (DFS) frameworkwas developed to conduct comprehensive ground assessments on the benefits and challenges of renewable energy-powered lift irrigation.Total 10 training events for 200 individuals including local, provincial, and federal government stakeholders, private sectors, communities, civil societies, and academia across three provinces, various institutions, and 85 local governments were conducted to disseminate knowledge and build capacity on the use of the PURE platform and Solar PV irrigation design.Similarly, with the support of ICIMOD, AEPC managed to install two pilot solar PV cold storage units, each with a 10-metric-ton capacity and equipped with ice battery technology at Kapurkot, Salyan and Dhangadi, Kailali vegetable centres. Pilot sites were selected after technical studies in 19 market centres. About 2,293 individuals (2,240 farmers, 23 traders, 30 wholesalers), have been benefited from the projects.

Furthermore, in April 2024, Energy Week focusing on renewable energy for agriculture concurrently at National, Regional, and Global conferences in Nepal was conducted in collaboration with ICIMOD and IWMI. Total of 687 participants from 19 countries attended the event.

Similarly, In February 2024, AEPC in collaboration with Renewable World organized national workshop on Energy Transition for Economic Prosperity with the objective todevelop a better understanding to create synergies among Government, INGOs/NGOs/ Donors and Private sector to promote Clean Energy in Nepal to contribute to energy security and economic development and identify priority actions that contribute to COP 28 declarations of tripling the RE capacity and double the progress of Energy Efficiency by 2030.

In addition, AEPC as the Delivery Partner of the Ministry of Finance to implement the GCF readiness and

preparatory support programme conductedmore 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 Communitiesand other stakeholders in the area of climate change and climate financing.

Municipal Waste to Energy Project (30 Tons Per Day-TPD), Birendranagar Municipality, Surkhet

CHAPTER 6

RENEWABLE ENERGY RESULT AREAS

6.1 ACCESS TO CLEAN ENERGY

The promotion of RE in Nepal has played a crucial role in delivering clean energy access to those in need. To date, cumulative3.65 million households benefited by clean energy. Among them, about 1.5 million households benefitted from electricity access resulting from installation of more than 90MW of electricity through mini/micro-hydro and solar energy initiatives (ISPS have been powering health and education, solar powered pumping systems have been lifting water for drinking and irrigation)and about 2.15 million households benefitted from clean cooking solutions (ICS, MICS, Biogas, Electric Cookstoves). These initiatives have generated 40,000 jobs in this sector.

During the reporting period, electricity generation was successfully accomplished through mini/micro-hydro projects. This achievement has not only improved access to electricity for numerous people but has also opened doors for the establishment of local businesses. Furthermore, by restoring and rehabilitating the mini/micro-hydro projects, electricity access has been reestablished for a significant number of households. Over a certain number of households have benefited from electricity generated through solar home systems. Similarly, the installation of solar mini-grids has provided lighting for around households.

IWM technology has been instrumental in aiding rural households by providing faster agro-processing services, thereby reducing physical strain and mitigating the potential increase in the use of fossil fuel-based diesel mills. The continued operation of such IWM during the reporting period is anticipated to deliver effective milling services to rural households.

6.2 SUSTAINABLE DEVELOPMENT BENEFIT

The promotion of RE and EE by AEPC brings a wide array of sustainable development advantages that can be entirely attributed to these technologies.

Environmental Benefits: Efficiently utilizing locally available RE resources for power generation aims to substitute carbon-intensive fossil fuels and traditional biomass in energy production, ultimately leading to a 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. Additionally, 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 reliance on imported fossil fuels. The cost-effective and economically advantageous nature

of clean cooking solutions benefits households. Additionally, it opens up new entrepreneurial possibilities and enhances income potential through the sale of related products and accessories.

Social Benefits: RE projects facilitate community engagement and cooperation in project management and implementation. Likewise, in the case of waste-to-energy projects and biogas initiatives, this approach alleviates the social burden associated with efficient waste management.

Technology Transfer: Certain RE technologies, such as large biogas and wind power, introduce new technological options for local companies to become acquainted with and to add to their business portfolio. From a wider standpoint, this presents the local market with the chance to diversify their service portfolio as per the latest advancements in these technologies.

The technologies put into practice in the reporting periods contribute directly to the attainment of Sustainable Development Goals 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 as well.

Figure 27: 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 31259 tCO2eq. The detail technology wise emission reduction achieved is given in. The quantities of emission reductions given above are the estimated amount of emission reduction and do not resemble to the tradable ERs.

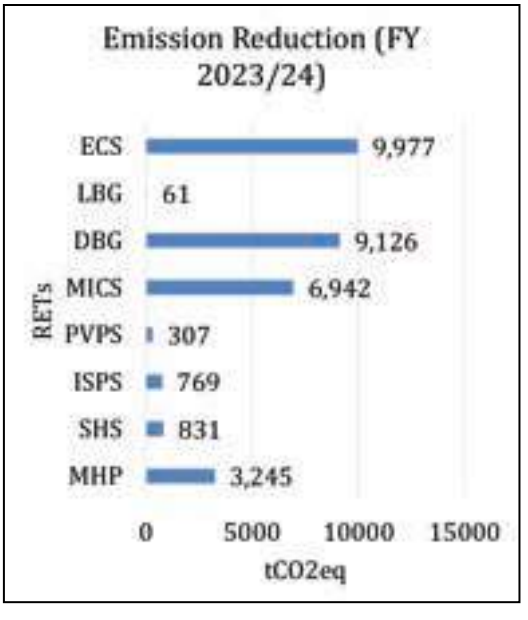


Figure 28 : Emission Reduction Achieved by RETs installed during reporting period

6.4 CASE STUDIES

Solar Rooftop in industrial sector to minimize electricity cost and fossil fuel consumption

Yeti Carpet Pvt. Ltd. located at Birgunj of Parsa district of Nepal, is a joint venture between the two business houses, Reliance Group and Kedia Group. The industry is located at a distance of approximately 1 km from the Jitpur Simara highway and approximately 8 km away from Simara Airport. The site has a great scope for solar power generationthroughout the whole year with availability of estimated 300 sunny days.

Yeti Carpet, as stands for Nepal's pioneer in non-woven and tufted carpet production, the industry has been using state-of-the-art machinery sourced from Belgium, China, and India to manufacture carpet products. Yeti Carpet Pvt. Ltd. has installed 303.6 kWp solar PV system on its rooftop. The energy produced from the Solar Rooftop (SRT) has significantly displaced the energy consumption of industry from diesel as well as minimize the consumption of grid electricity.

As a remarkable contribution to a better future as well as diversification in energy sources, Yeti Carpet is one step ahead move towards the green energy with adopting a rooftop PV system. The project is completed and successfully conducted testing and commissioning on 2080/12/21 (B.S.) which met all the technical standards and requirements. The projectwas installed by Gham Urja Sewa Pvt. Ltd. The industry used to consume60 litresdiesel per hour before the installation of the Solar System. After installation of SRT, consumption is reduced by half i.e. 30 litres per hour. Similarly, electricity bill is reduced by 2 to 3 lakhs per month. Installation of SRT also helped to reduce carbon emission. The project has significant contribution on environment and energy efficiency. The project is installed with support from AEPC/KFW-DKTI Solar Project which is supported by the Government of Nepal and the Government of Germany.The total cost of the project is NRs. 17,032,363 of which AEPC support is NRs. 3,280,676 in the form of interestsubsidy.

Waste to Energy Project brings significant impact on waste management and circular economy

The large-scale biogas waste to Energy project implemented under MGEAP has made significant national level impacts, addressing both sustainable waste management and renewable energy generation needs. With the support from AEPC and WB, Jeevan Bikash Samaj (the subproject developer) has constructed a biogas plant in Dhanpalthan Rural Municipality – 3, Morang, Koshi Province.

The project is playing crucial role in managing the cow dung, poultry waste, and vegetable waste from the surrounding area, utilizing the waste as feedstock for CNG biogas production. According to Dhananjaya Kumar Singh, Engineer of sub-subproject (Jeevan Bikash Samaj), the project utilizes cow dung, poultry waste, and vegetable waste daily, yielding around 130 kg of CNG biogas each day. Additionally, the plant generates around 7-9 tons of compost fertilizer monthly, providing a valuable by-product that further supports agricultural activities. Furthermore, the CNG biogas produced from the subproject is currently supplied to a Jeevan Bikash Dairy products in Biratnagar, which uses 18-20 cylinders daily as a fuel source. By utilizing these numbers of gas cylinders, the Dairy offset 800-1000 kg/day of firewood that was previously burned for fuel each day. This switch has resulted in cost saving of Rs. 8,000 – Rs. 10,000 which was previously spent on firewood. The Subproject's Engineer further stated that, in addition to supplying gas to Jeevan Bikash Dairy, the subproject is also supplying CNG gas cylinders to two other commercial entities—Dudhwala Dairy and Radheshyam Hotel in Biratnagar. These two entities together utilize approximately 30 cylinders of CNG per month. This transition not only highlights the cost- efficiency of the subproject but also indicates a reduction in carbon emissions that would have occurred if the Dairy continue to rely on firewood. In addition to biogas, the subproject produces approximately 6 tons of compost fertilizer on monthly basis and sells it in the market at a rate of Rs. 24/1kg. Mr. Singh also emphasizes that the organic fertilizer produced not only provides local farmers with a more affordable option but also increases the agricultural production and positively impacts the livelihood of farmers. Thus, the large-scale biogas sub-projects like Jeevan Bikash Samaj are playing crucial role to promote a circular economy by converting waste into valuable resources, improving environmental health, creating social benefits for the community, enhancing local economic as well as contributing a commitment to sustainable development.

ChukeniKhola Mini Hydro: Source of reliable electricity supply to Jumla

The ChukeniKhola Mini Hydropower (CKMHP), with a capacity of 998kW, has been operational and now provides reliable electricity to 6,250 households (HHs). Project is located in the remote region of Patarasi Rural Municipality, situated about 25 kilometers from the Nepal Electricity Authority's (NEA) power plant at Ghuguti in Chandannath Municipality. The plant also exports electricity to Jumla Bazar, benefiting around 2,800 households. NEA has already installed a net metering unit at Thinkebandh to facilitate the import of energy from CKMHP.

The CKMHP is being managed by ChukeniKhola Electricity Cooperative Limited which was legally registered at the Division Cooperative Office, Surkhet District, Karnali Province. The project was developed with financial assistance from the Asian Development Bank (ADB), South Asia Subregional Economic Cooperation-Power Expansion Project (SESEC- PEP) and the Alternative Energy Promotion Centre (AEPC) along with community equity, and loan facilities. The technical support provided by the Project Implementation Consultant (PICs) and the Renewable Energy for Rural Livelihood (RERL) programme.

Total cost of project is NRs. 446.38 million. The project financing mixed is AEPC Subsidy funded through ADB & GoN matching grant (NRs. 284.43 million), ADB Loan channelized through partner bank (Agricultural Development Bank Ltd) NRs. 60 million and community upfront equity NRs. 50.593 million. The project has an installed capacity of 998 kW with a gross head of 143.25 m with the design discharge is 1.00 cumec corresponding to 90 percentile exceedance of flow. The expected annual energy generation is 7.5 GWh includes 2.859 GWh Dry Energy (Poush-Chaitra) and 4.641 GWh Wet Energy (Baisakh-Mangsir). The project has been exporting about 509kW as per demand at Jumla Bazar on the month of October 2024 and envision of increasing energy demand day by day.

As the sun sets over Patrasi Mountain, the lights in Jumla and Mugu illuminated, symbolizing a community united by progress and hope. The Chukeni Mini Hydropower Project is more than just an energy solution; it is a testament to what can be achieved when communities, supported by organizations put effort for a shared vision. In the heart of the Himalayas, Jumla is no longer just surviving; it is flourishing. Once again community owned mini micro hydropower proves that “Small is Still Beautiful”.

Electrifying Na Valley through Solar Minigrid impacts on Tourism Potential

Na village, located at an altitude of 4,200 meters in the remote Rolwaling Valley of Dolakha district, is a scenic yet isolated settlement near the world-renowned Tsho Rolpa glacial lake. Despite its significance as a popular destination for trekkers and mountaineers, Na village had long struggled with the absence of basic infrastructure, including electricity. In a major breakthrough during the 2023/2024 period, AEPC successfully installed a 30-kilowatt solar mini-grid in Na village, representing a transformative step towards improving the quality of life for its residents and bolstering tourism.

Electrifying Na village was no simple task due to its remote location and harsh environmental conditions, particularly heavy snowfall that renders the region inaccessible during certain months. The village had no connection to the national power grid, and the installation of electricity and telecommunications infrastructure posed logistical challenges. Recognizing these barriers, the primary objective was to implement a sustainable solution to power homes, businesses, and essential services in Na while promoting tourism and enhancing local livelihoods.

To meet the energy needs of Na village, a 30-kilowatt solar plant was installed under a collaborative effort between the Alternative Energy Promotion Centre (AEPC), the Water Resources and Irrigation Development Division, and Gaurishankar Rural Municipality. The project was made possible through cost-sharing, with AEPC covering 90% of the total project cost of NPR 31.4 million, while the Water Resources and Irrigation Division and the Rural Municipality contributed NPR 2.5 million and NPR 989,000 respectively.

The electrification of Na village has had a profound impact on both the local community and the region's tourism potential. The solar mini-grid now powers 72 households and 20 streetlights, providing reliable electricity for residents, homestays, and small businesses. With electricity now available, the local community, which migrates to nearby Beding during the harsh winter months, can extend their stay and engage in income-generating activities, such as running homestays for trekkers and climbers.

Additionally, Na and Beding are known as gateway villages for Everest climbers, and with reliable electricity, the village can now offer better services to tourists. This will likely lead to increased tourism traffic in the region, especially to the Tsho Rolpa glacial lake, enhancing the area's economic prospects.

Solar Irrigation for Multiple Agricultural Businesses.

Mahendra Raj Ingnamis permanent resident of Arjundhara Municipality-11,Salbadi, Jhapa. After returning from foreign employment in Saudi Arabia, he decided to work in agriculture. Working with multiple agriculture activities like fishery, vegetable and paddy farming, not only gave him a financial gain but also helped him stay healthy. At that time, Bhutanese refugee camps established in his village had enormous demand for vegetables. Seeing this opportunity, Mr. Ingnamdid not make any delay to start vegetable farming. He started growing cabbage on a large scale on his own land. This farming established him in this sector. Later, he decided to diversify farming according to the demand and adopt multiple farming. He has received several training courses on agriculture practice from different development organizations including 15 days nationwide visit to learn best scientific practices in agriculture across the country. Mr. Ingnam was heavily dependent on the diesel generator for the irrigation needs of the farm. Such method of irrigation was expensive as well as major source of environment pollution.

AEPC/KFW- DKTI Solar Project identified such farmers from the different corners and disseminated solar irrigation pumping systems to provide reliable irrigation facilities powered from clean energy to their land. AEPC-DKTI project has supported a 3 kWp irrigation system by providing subsidy support of NPR 618,200 for implementation. Subsidy for the system was channelized by GoN from the support by the Government of the federal republic of Germany through German development cooperation through KFW development bank. After installation of Solar Irrigation Pump, diesel consumption is reduced significantly which contributes to promote clean energy and reduce carbon emission.

Saras Beverages believes that "Industries should invest in renewable energy

Saras Beverages has tapped into the sun's energy to manufacture its best-selling beverage, Red Bull. Situated in the southern plains of the country in Nawalpur, the company has installed a cutting-edge rooftop solar system with a capacity of 514.80 kWp. Partnering with Gham Urja Pvt. Ltd. under the Renewable Energy Service Company (RESCO) model, this project has been supported by the Government of Nepal's Sustainable Energy Challenge Fund's (SECF) Generation-Based Incentive window.

With a forward-thinking approach, Saras integrated solar power into its operations from day one. To keep up with its impressive production capacity of 120,000 liters per day, Saras needed a reliable source of energy, which it found through the photovoltaic (PV) system. "After the raw materials, energy is the biggest cost for us," said Mr. Naresh Paneru, General Manager of the factory. "We wanted to reduce this cost and be smart about our investments from the very beginning. This rooftop solar system has been instrumental in achieving that," he added. "Previously, we used a larger-capacity backup diesel generator, which consumed 900 liters of diesel per week," said Mr. Paneru. "After the switch to solar, we have reduced this to less than 500 liters per week. This has reduced our dependence on fossil fuels." He added.

Highly satisfied with the performance of its PV system, SARAS firmly believes that industries should invest in renewable energy technologies to not only reduce operational expenses but also contribute to environmental sustainability. By embracing solar power, companies can mitigate their carbon footprint, enhance energy reliability, and ultimately drive positive change in their communities. Industries such as SARAS are laying the cornerstones for environmental stewardship and responsible business practices. They also help Nepal in the attainment of the Sustainable Development Goals (SDGs) and the Nationally Determined Contributions (NDCs).

SECF- a viability gap funding mechanism is embedded within the Central Renewable Energy Fund (CREF), a financial mechanism of the Alternative Energy Promotion Centre, which was established and operationalized with funding support from the British Embassy, Kathmandu and technical assistance from Nepal Renewable Energy Programme (NREP). The GBI window of SECF incentivizes energy generation from Renewable Energy (RE) sources by providing support of Rupees 1.50 per unit for 5 years.

Rehabilitation of MHP brought happiness to Woman Entrepreneur

Unlike many married Nepali women, 21-year-old Krishna Pariyar never had to depend on her husband financially. Pariyar, a resident of Pilichaur in Jagannath Rural Municipality-1, Bajura, didn't have to depend on anyone from her maternal home either. Her life took a turn for good—a revolutionary turn, so to speak—when her tailoring business took off. She had invested NPR 20,000 in the business. "Previously, I would sew around eight pairs of clothes with the manual machine," she said. "Now, with an easy supply of electricity, I make up to 18 pairs using electric sewing machine."

Until 2015, the rural municipality was without electricity. Then came the 100kW Badigaad Micro Hydropower Project (MHP) and brightened up the village. Pariyar represents thousands of Nepali Dalit women who have to battle the existing social prejudices to live independently. But even after access to electricity, it hasn't been a smooth sailing for its residents. When a flash flood in Badigaad river swept away the structure of the MHP, they had to live in darkness. Locals were worried as to whether or how the project that was supplying electricity to 1200 households would be rebuilt.

"People would come to me to order clothes walking 4-5 hours but for a lack of power, I couldn't deliver their orders on time," Pariyar said. Electricity has directly helped her business, which subsists her family of eight. Pariyar aims to expand her shop. "If my business runs at this rate, I aim to add more machines and expand the shop," she said, noting that the hydro project is back in operation after maintenance with help from the Japanese government. "My work has increased by 80 percent since the electricity came back," Pariyar said. "My income has risen and so has my savings."

Reducing Fossil Fuel dependency with Biomass Pellet Burner

Galaxy Packaging stands as a prominent name in the packaging industry, supplying to some of Nepal's most well-known brands. Like many industries, it had long relied on diesel generators to meet its energy needs—until recently. Recognizing the rising costs and environmental impact of fossil fuels, Galaxy Packaging made a strategic switch biomass pellet burner. The decision was not just an operational shift but a sustainable leap toward energy efficiency. Previously reliant on diesel generator, their transition to a biomass pellet burner has had a transformative impact. With diesel prices steadily increasing, the shift to biomass has enabled the company to significantly reduce fuel expenses. Manish Agrawal, Director of the industry said "Previously we were using Diesel Generators, which would cost us around NRs. 1,500,000 monthly now after switching to biomass pellet burners this cost has reduced to approx. NRs. 1,000,000".

Moreover, biomass pellets are a locally sourced, renewable energy resource, further reducing the company's dependence on imported fossil fuels. This switch has provided the company with greater energy security and price stability, ensuring that operations run smoothly without being disrupted by volatile fuel markets. Under Nepal Renewable Energy Programme's Sustainable Energy Challenge Fund's Demand Aggregation Window, Janda Devi Nepal Pvt. Ltd. provided technical assistance to Galaxy Packaging by conducting a cost-benefit analysis for switching from diesel burners to pellet-based burners. Janda Devi successfully installed the pellet burners, replacing the existing diesel burners. They also assisted Galaxy Packaging in selecting suitable burner suppliers and are responsible for providing regular repair and maintenance services. Additionally, Janda Devi serves as the pellet supplier for the company.

Galaxy Packaging's decision also aligns with Nepal's broader ambition to adopt cleaner energy solutions. Moving away from diesel fuel means the company has lowered its carbon footprint, playing a small but meaningful role in mitigating climate change. The biomass pellet burner not only produces fewer emissions but also promotes the utilization of agricultural waste, giving it an added environmental benefit. The success of Galaxy Packaging demonstrates how sustainable energy solutions can be both economically viable and environmentally responsible. As more industries face rising fuel costs and environmental scrutiny, the company's journey serves as an inspiration for others to explore alternative energy options. Galaxy Packaging by embracing a biomass pellet burner has set a new benchmark for sustainability in Nepal's manufacturing sector—one that saves costs, reduces fossil fuel dependency, and contributes to a greener future. Galaxy Packaging's story is a testament to how even small steps toward sustainability can create a ripple effect, benefiting businesses, communities, and the planet alike.

Training on third party monitoring of Renewable Energy Technologies for Consulting Firms

CHAPTER 7

CHALLENGES, ISSUES AND LESSONS LEARNT

7.1 ENERGY SECTOR CHALLENGES

The Government of Nepal has been actively advocating for RE since the mid-1970s. Over the years, it has periodically developed various policies, strategies and plans guidelines to promote RE within the country. Discussions on EE started in Nepal since 1990s but got the momentum after 2010 only. Following a significant political transformation in the nation, addressing the substantial knowledge and information gaps among government authorities at various levels of governance has become a major challenge. With the recent establishment of a federal structure, there is a considerable challenge in aligning and coordinating RE initiatives across all three tiers of government. Local governments have assumed greater roles and responsibilities in the comprehensive planning and implementation of RE. Nevertheless, these local and provincial governments face limitations in terms of technical and managerial capacities needed for effective promotion of RE and EE.

The sustainability of off-grid RE systems is a significant issue for the sector. After the installation, rural communities often struggle to maintain and operate these RE systems. Some facilities that can produce excess revenue are thriving, but the others are merely surviving and are unable to offer consistent and high-quality electricity as originally envisioned. The revenue they generate barely covers their operational expenses. These systems are viewed more as "community assets" rather than profit-generating "social enterprises" and face multiple challenges associated with collective action.

To boost the RE sector, there is a need to expand the adoption of RE technology, effectively promote end-use applications, and connect the electricity generated by RE systems to the national grid. The sector requires a significant push to gain momentum. Awareness about energy options and financing remains limited, and there is a lack of organized efforts to stimulate demand. Substantial financial obstacles persist, and the shift towards a market-driven or credit-based model has been sluggish. Moreover, the RE and EE market has not fully capitalized on innovative methods, the use of the most advanced technologies, and global best practices. Moreover, the energy sector in Nepal continues to heavily rely on conventional resources, placing stress on natural resources and the environment.

About 54% of the population still depends on traditional energy sources for cooking, presenting a substantial sector-wide challenge. Few recent challenges of the RE sector include 1) transition of promotion of household based RE technologies from federal to local governments; 2) lack of counterpart funding to DP supported programmes/projects; 3) Lack of adequate resource to achieve the GoN's target of providing access to electricity and clean cooking solutions

to all; 4) Grid connection of off-grid renewable energy projects; and 5) lack of larger scale projects and programs for implementation of energy efficiency initiatives.

7.2 ISSUES IN RE AND EE

AEPC has been established through a formation order, and to provide it with a more solid foundation and strengthen the RE and EE agenda, it is essential to formulate an act that can regulate RE and EE sector and transform AEPC into a new organization with expanded mandates. Recently, Ministry of Energy, Water Resources, and Irrigation (MoEWRI) has prepared and submitted Renewable Energy and Energy Efficiency Bill to federal parliament (Rastriya Sabha) after approval from council of ministers. Now the bill is under discussion at Bill Management Committee of National Assembly.

Some of the issues in RE and EE sector are:

- Implementing operational procedures in collaboration with local and provincial governments.
- Addressing the issue of staff turnover and retention of qualified personnel.
- Collaborating with development partners and attracting increased investments from international climate funds like the GCF and Mitigation Action Facility (MAF).
- Allocating revenue from carbon-related activities for investments in the RE sector.
- Coordinating and aligning support from development partners within the National Renewable Energy Framework.
- Expanding activities related to EE.
- Upholding quality standards for RETs and adopting innovative technologies.
- Developing institutional and human resource capacity for complying with new policies and regulations to enhance system improvements.
- Institutionalizing National Renewable Energy Management Information System (NREMIS) to capture data from the federal, provincial, and local levels.
- Strengthening capabilities and establishing facilities for an effective used lead acid battery management system.
- Transitioning AEPC into a Centre of Excellence on RE and EE.

7.3 LESSONS LEARNT

Based on experience on implementation of programs/projects, following are the key lessons learnt:

- Electricity access has significant positive outcomes for rural livelihoods, improving health education, sanitation, productivity and income, leading to further beneficial effects. Concurrently, rural development focused on productive uses creates a demand for more electricity and additional revenue streams, contributing to the profitability and sustainability of off-grid RE systems. Hence, the promotion of RE should not be solely evaluated from a financial profitability perspective but should also consider its potential for broader socio-economic impact.
- In the foreseeable future, subsidies and grants will remain a substantial part of the initial capital expenditure due to the high upfront costs associated with

decentralized RE solutions. To attract private sector involvement in the operation and management of RE systems, the subsidy policy includes not only upfront capital subsidies based on kilowatts but also subsidies for energy consumption to cover a portion of operational expenses. However, this new provision has failed to attract interest, as investing in community-owned off-grid projects is perceived to carry very high risks. It is essential to explore alternative innovative incentives to make private investments more appealing.

- The VGF support introduced through SECF incorporated under CREF has got increased attention from the private sector. Still, dedicated capacity building and further awareness is required for broader adoption of this mechanism
- For the integration of results and outcomes of three tier of government, the NREMIS needs to be made
- The development partners' supports are limited and also are more aligned towards more investment focused rather than grants, orienting towards more result-based financing, integrating with more cross cutting issues like climate resilience infrastructure support. Therefore, more concentrated and dedicated efforts are needed to tap these resources from development partners.
- Commitment of funds for projects during financial closure of projects and difficulties in turning realities during project implementation are key challenges especially with the projects under partnerships with local and provincial governments. Therefore, more coordination and project implementation support are needed to ensure timely executing of ongoing projects and programs.

7.4 OPPORTUNITIES AND WAY FORWARD

Despite the challenges, enormous opportunities are present, and it is essential to capitalize on these available opportunities. Opportunities for the implementation of RE and EE initiatives and achieving efficient generation, transmission, distribution and use of energy. However, the sector has not been successful in attracting an adequate amount of financial resources. AEPC's efforts in mobilizing resources through climate funds has good initial results and these needs to maximized further

Furthermore, AEPC must proactively explore what can be leveraged through partnerships with one or more global initiatives. AEPC identifies the following opportunities for the advancement and implementation of RE and EE in Nepal.

- Support MoEWRI in drafting of RE and EE regulations, O&M survey and formulation of working guidelines as per the need of RE and EE Bill. Once enacted, this bill can transform the sector.
- Strengthen the institution by enacting its own act and enhancing coordination between the renewable energy sector and other sectors such as agriculture, forestry, health, education, and urban development.
- Forge strong partnership with provincial and local levels to support RE and EE initiatives. AEPC aims to support RE and EE

development as the "Centre of Excellence" in the changed context.

- Engage the private sector as investors and partners rather than merely contractors, while promoting renewable energy-based entrepreneurship.
- Place special emphasis on reaching the most remote and underserved populations.

- Global concerns about climate change and its consequences create opportunities for the deployment of RE, EE and energy transition.
- National commitments to Sustainable Development Goals (SDGs), targets necessitate collective efforts to promote clean energy and energy transition including reaching those in underserved areas and helping upgrade the energy access of those already using basic forms.
- New and additional funding opportunities provided by international climate financing mechanisms like GCF, Climate Investment Fund (CIF), and Mitigation Action Facility can facilitate the attraction of national private sector investments, as participation in such funds can derisk the private investments.
- Capitalizing on synergies with the Nepal Electricity Authority (NEA) and other institutions for grid integration of RE systems.
- The best practices of AEPC implemented Large-Scale Biogas Plants and Waste-to-Energy Projects presents an area where AEPC's experience can offer substantial advantage in partnering with local governments and private sector.
- Utility-Scale Grid-Connected Solar Systems have significant potential for reducing the persistent reliance on imported energy.
- Successful implementation of VGF-based SECF projects have potential to upscale the initiatives at wider scale.

To harness these opportunities while addressing the challenges, AEPC has outlined the following proposed steps for the way forward, which may necessitate further strategic discussions.

- Design and implement projects aligning GoN needs and Development Partners (DPs) priorities areas.Design new projects and programs on energy efficiency.
- Lead the way in rapidly shifting paradigms in areas like municipal waste-to-energy projects and large-scale biogas plants, bottling, and pipelines, with the aim of up-scaling the renewable energy sector in terms of capacity, investment, size, and innovation.
- Continue Implementation of Sustainable Energy Challenge Fund (SECF) to ensure inclusive and broad participation and stimulate innovation.
- Implement new financial mechanisms like smart subsidies, VGF, challenge funds, and result-based financing to prepare the private sector to attract more investments in renewables.
- Secure international climate finance by promptly developing project concepts and pipelines, and assemblea skilled team to

prepare bankable proposals for climate financing.

- Operationalize NREMIS as integrated Renewable Energy database and information exchange system that spans all three levels of government, serving as a hub for national and international knowledge management.

- Enhance the Compliance Function by increasing its resources, formulating procedures to enhance integrity and prioritizing compliance-related findings.

ANNEXES

Annex-1: Progress achieved for the programs/activities implemented with financing from Government budget 2080/81 (2023/24)

S. N.	Activity/Program	Unit	2023/24		
			Target	Achievement	% Achievement
1	Improvement and Reconstruction of Clean Development Mechanism (CDM) Registered Micro Mini Hydro and Improved Water Mill	No.	7	7	100%
2	Detail Feasibility Study of Solar Mini Grid Projects	No.	10	16	160%
3	Detail Feasibility Study of Institutional, Community Biogas plants	No.	20	20	100%
4	Orientation and Capacity Building of Local level, province level and stakeholder for RE	No.	7	7	100%
5	Technical standards of five electrical appliances. Preparation of baseline and benchmark	No.	3	3	100%
6	Solar pump for irrigation	No.	200	202	101%
7	Electricity generation from mini grid project (Multiyear program)	KW.	700	390	56%
8	Solar light system installation in community and religious places	No.	150	147	98%
9	Integration of micro/mini hydro projects in national grid	No.	5	1	20%
10	Incomplete and sick micro hydro completed and rehabilitation	No.	10	3	30%
11	Installation of ICS for heating and cooking in household and mountainous districts	No.	2000	2000	100%
12	Clean energy program: replacement of dung cakes and agricultural residue for cooking	No.	17500	17500	100%
13	Support in energy efficiency to public and private institution	No.	10	10	100%
14	Productive energy use of RE technologies	No.	7	3	43%

Annex-2: Progress achieved for the programs/activities implemented under NRREP 2080/81 (2023/24)

S. N.	Activity/Program	Unit	2023/24		
			Target	Achievement	% Achievement
1	Community and Institutional Biogas Plant	No.	10	12	120%
2	Installation Access to clean energy with Household Biogas Installation	No	5000	1432	29%
3	World Bank supported Nepal Mini grid related W2E, solar/mini and micro hydro development grant and loan	Kw.	600	1	1%
4	Electrification through mini hydro installation (including SASEC project)	Kw.	1500	998	67%
5	Solar home system for un-electrified areas	No	7000	8306	119%
6	Solar water Pumping for Irrigation and Drinking water	No.	100	147	147%
7	Institutional Solar and Solar rooftop System Installation	Kw.	2000	2947	148%
8	Clean Cooking Solutions Project Implementation Under GCF	No.	10	7	70%
9	Tier 3 improved cook stoves and rocket stove installation at institutional and household level.	No.	2500	2508	100%
10	Carbon and climate change related activities	No.	5	5	100%
11	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on community electrification	No.	6	4	67%
12	Nepal Mini-grid related activities	No.	10	10	100%
13	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on solar	No.	10	10	100%
14	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on bio energy	No.	5	5	100%
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	3	100%
17	GESI related activities	No.	2	2	100%
18	DKTI related activities (solar energy promotion in rural and semi-urban areas)	No.	10	10	100%
19	Sustainable Energy Challenge Fund for promotion of RETs	No.	2	2	100%
20	Management of subsidy application form processing	No.	4	4	100%
21	NRREP Management Expenditure	No.	10	10	100%
22	Electricity generation from mini grid project (Multiyear program)	Kw.	200	0	0%
23	Promotion of Clean Cooking technologies under GCF	No.	20000	0	0%
24	Technical Assistance for SASEC Projects	Percent.	100	100	100%
25	Electrification through pico, micro and mini hydro projects	Kw.	300	314	105%

Annex-3: District wise installed RETs 2080/81 (2023/24)

District	MHP	SMG	SHS	LBG	DBG	MICS	ISPS	PVPS	EC
Achham	73	0	334	1	0	0	11	0	0
Arghakhanchi	0	0	0	0	0	0	0	0	0
Baglung	0	0	0	0	0	45	6	0	0
Baitadi	0	0	275	0	0	1	5	0	0
Bajhang	86	0	154	0	0	0	24	0	0
Bajura	0	0	110	0	0	611	2	0	0
Banke	0	0	11	0	17	146	1	13	0
Bara	0	0	16	0	13	0	0	14	0
Bardiya	0	0	0	0	42	0	1	16	0
Bhaktapur	0	0	0	1	2	0	0	0	0
Bhojpur	0	0	0	0	0	0	0	0	0
Chitwan	0	0	48	0	8	0	8	14	0
Dadeldhura	0	0	444	0	7	0	0	0	0
Dailekh	0	0	575	0	10	0	40	0	0
Dang	0	0	61	0	53	208	2	14	0
Darchula	100	0	64	0	6	0	3	0	0
Dhading	0	0	57	0	42	0	0	0	710
Dhankuta	0	0	0	0	0	0	0	0	120
Dhanusa	0	0	0	0	1	0	0	3	0
Dolakha	0	30	0	0	7	223	1	0	0
Dolpa	0	50	239	0	0	0	9	0	0
Doti	16	0	49	0	0	0	6	2	0
Gorkha	0	0	205	0	34	1	1	0	1420
Gulmi	0	0	0	0	0	0	6	0	2375
Humla	73	0	390	0	0	142	11	0	0
Ilam	0	0	0	0	22	0	0	2	0
Jajarkot	0	300	1,144	0	0	0	27	0	0
Jhapa	0	0	0	1	24	0	0	39	0
Jumla	998	0	138	0	0	0	2	0	0
Kavrepalanchowk	0	0	0	0	31	0	18	0	2000
Kailali	0	0	43	0	37	0	1	24	0
Kalikot	27	0	450	0	0	50	27	0	0
Kanchanpur	0	0	9	0	40	0	2	16	0
Kapilvastu	0	0	0	0	16	0	0	8	0
Kaski	0	0	0	3	31	151	0	0	300
kathmandu	0	0	0	0	6	0	0	0	3883
Khotang	0	0	89	0	0	0	17	0	0
Lalitpur	0	0	0	1	2	45	5	0	3535
Lamjung	0	0	12	0	406	0	8	0	0
Mahottari	0	0	0	0	1	0	5	16	0

District	MHP	SMG	SHS	LBG	DBG	MICS	ISPS	PVPS	EC
Makwanpur	0	0	161	1	94	196	0	8	0
Manang	0	0	0	0	0	0	0	0	0
Morang	0	0	0	0	19	0	1	13	0
Mugu	38	0	44	0	0	66	3	0	0
Mustang	0	10	0	0	0	0	0	0	0
Myagdi	0	0	50	0	0	184	0	0	0
Nawalparasi East	0	0	9	0	0	0	3	4	0
Nawalparasi west	0	0	0	0	5	0	0	1	0
Nuwakot	0	0	5	1	12	40	0	0	960
Okhaldhunga	0	0	58	0	0	0	1	0	0
Palpa	0	0	20	0	11	0	2	0	0
Panchthar	0	0	22	0	0	0	0	0	0
Parbat	0	0	0	0	0	0	0	0	0
Parsa	0	0	0	0	9	0	1	25	0
Pyuthan	0	0	13	0	0	0	0	0	540
Ramechhap	0	0	0	0	16	120	2	0	627
Rashuwa	0	0	0	0	8	0	0	0	0
Rautahat	0	0	0	0	59	0	0	33	0
Rolpa	0	0	226	0	0	0	2	0	530
Rukum East	0	0	94	0	0	0	0	0	0
Rukum West	0	0	391	0	0	0	6	0	0
Rupandehi	0	0	0	0	0	0	7	4	0
Salyan	0	0	731	0	5	0	8	0	0
Sankhuwasabha	0	0	275	0	16	0	0	0	0
Saptari	0	0	0	0	5	0	0	10	0
Sarlahi	0	0	0	0	47	0	2	55	0
Sindhuli	0	0	576	0	25	0	0	5	0
Sindhupalchowk	0	0	0	0	16	186	0	0	500
Siraha	0	0	0	0	1	40	1	3	0
Solukhumbu	0	0	0	0	0	18	0	0	0
Sunsari	0	0	0	1	13	0	0	5	0
Surkhet	0	0	498	0	12	0	17	2	0
Syangja	0	0	0	2	2	35	0	0	0
Tanahun	0	0	24	0	155	0	1	0	0
Taplejung	0	0	42	0	21	0	1	0	0
Terhathum	0	0	41	0	0	0	0	0	0
Udayapur	0	0	109	0	23	0	4	0	0
Total	1411	390	8306	12	1432	2508	311	349	17500

Solar Rooftop installed in Bhudeo Khadya Udhyog with support from AEPC/NREP

Distribution of Electric Cookstove in Dillichaur, Jumla with support from AEPC/RERL

Event organized by AEPC and GIZ/POSTED for unveiling Study Report entitled " Security, Affordability and Reliability of Nepal's Electricity Mix

National Workshop on Energy Transition for Economic Prosperity jointly organized by AEPC and Renewable World

Mr . Rudra Prasad Khanl, Director, AEPC honored on the occation of 27th AEPC day for his completion of 20 years dedicated service to AEPC

Utilization of water supplied through Solar Irrigation Pump for Fishery business with support from AEPC/NREP

Piluwa Khola Rural Solar Drinkg Watersupply Project at Chainpur Municipality-10, Sankhuwasabha

Induction (Electric) Stove Repair and Maintenance workshop at local level with support from AEPC/NREP

Field visit to Chukeni Khola Minihydro, Jumla with ADB and UNDP

Project Completion and Learning Sharing Workshop of AEPC/KFW supported Solar Energy Project

Workshop on "high-level technologies for energy transition" Organized by ADB from 22 to 26 January 2024 in Japan

Global Science Policy Forum organized by AEPC, ICIMOD and IWMI from 24 to 26 April 2024