



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



Progress at a Glance: Year in Review
FY 2079/80 (2022/23)

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

Institutional Solar Photovoltaic System (64 kWp) installed at Gorkha District Hospital, Gorkha (Cover Page).

Welcoming newly appointed Hon. Minister, Mr. Shakti Bahadur Basnet, Ministry of Energy, Water Resources and Irrigation, at AEPC.

Mr. Dinesh Kumar Ghimire, Secretary (Energy), Ministry of Energy, Water Resources and Irrigation, together with relevant officials and local people during inauguration of Sunkoshi Kakani Solar Minigrid Project (70 kWp) at Sunkoshi Rural Municipality, Okhaldhunga.

Dhorpatan Bhujji Khola MHP (60 kW) at Dhorpatan Municipality-9, Baglung

Welcoming newly appointed Executive Director, Mr. Nawa Raj Dhakal, at AEPC office.

Capacity Building Training under Readiness Preparatory Support Programme funded by GCF.

Municipal Waste to Energy Project, Damak Municipality, Jhapa

Monitoring visit of Sunkoshi Rural Solar Drinking Water Project at Sunapati Rural Municipality-4, Ramechhap

Progress at a Glance: Year in Review Fiscal Year 2022/23

November, 2023

Copyright © AEPC

Published by:

Alternative Energy Promotion Centre

www.aepc.gov.np

Printed in Nepal

Disclaimer: This report is prepared by Alternative Energy Promotion Centre (AEPC) based on the monthly and quarterly progress reports. The information, statement, statistics and commentary (together the information) contained in this report have been prepared based on AEPC's MIS and information provided by respective technical section and projects/programs. This report is prepared for information dissemination purpose and does not include detail analysis of any progress indicators or statistics.



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



Progress at a Glance: Year in Review
FY 2079/80 (2022/23)



Letter No.

Ref. No.

MESSAGE FROM THE CHAIRPERSON

On this auspicious occasion marking the 27th Annual Day of the Alternative Energy Promotion Centre (AEPCC), I am truly delighted to extend my heartfelt congratulations to the entire AEPCC family, including our esteemed partners and stakeholders.

As the appointed guardian of renewable energy (RE) and energy efficiency (EE) in our nation, AEPCC's unwavering commitment and painstaking endeavors in the quest for enhancing access to clean energy are nothing short of commendable. The center's dedication to deploying small-scale RE solutions and the adoption of EE, extending from humble households to bustling communities, institutions, and thriving enterprises, is a testament to their unceasing pursuit of excellence. These tireless initiatives have ushered in a new era, drastically reducing our dependency on conventional energy sources and those procured from afar, ultimately propelling us toward a realm of low-carbon economic development.



The Government of Nepal, unwavering in its commitment to the advancement of renewable energy and energy efficiency, acknowledges the abundant bounty of renewable resources within our grasp. We firmly recognize energy's pivotal role as the engine driving socioeconomic development. Thus, harnessing renewable energy stands as an imperative, both for the fulfillment of our domestic energy needs in a reliable and sustainable manner and for the simultaneous promotion of economic growth and fortification of our energy security. Nepal distinguishes itself on the global stage by enshrining renewable energy development in its constitution as a state policy, an embodiment of our unwavering dedication to the preservation, stewardship, and judicious utilization of our precious natural resources. In our tireless pursuit of this noble vision, we are actively working on the formulation of the Renewable Energy and Energy Efficiency Bill, which shall pave the path forward, forging a robust legal and regulatory framework for the advancement of the renewable energy and energy efficiency sectors in Nepal.

AEPCC's extraordinary accomplishments shine most gloriously in the provision of modern energy services to more than 20% of households, primarily in the remote rural landscapes, far beyond the grasp of the national grid. Despite the sweeping expansion of the national grid, AEPCC's steadfast focus on the promotion of off-grid renewable energy systems remains of paramount significance. It is a vital endeavor, especially considering the daunting geographic challenges our nation presents, as it ensures that the blessings of modern energy touch even the farthest reaches of our rural and secluded communities.

In the fiscal year 2079/80, AEPCC achieved remarkable progress in the realm of renewable energy, despite the formidable challenges and obstacles. As we march steadfastly toward the realization of 100% electrification within the next two years, with Nepal's current status of electricity access reaching an impressive 98%, it becomes evident that our journey to universal electricity access hinges significantly on the continued promotion of off-grid energy solutions. Furthermore, AEPCC's ~~dedication to introducing innovative business models, empowering our valued partners, and mobilizing resources is of~~ paramount importance in our pursuit of energy transition targets.

The invaluable support of our Development Partners, Provincial Governments, Local Levels, the private sector, and civil society organizations has played a pivotal role in advancing our government's mission to ensure access to affordable, reliable, sustainable, and modern energy for all. In conclusion, I wish to extend my sincere gratitude to all our partners, stakeholders, and the unrelenting AEPCC team for their resolute dedication, tireless efforts, and harmonious cooperation in weaving renewable energy and energy efficiency into the very fabric of Nepal's energy sector. Your contributions illuminate the path to a brighter, more sustainable future, and for that, we are infinitely grateful.


.....
Mr. Shakti Bahadur Basnet

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





Government of Nepal
Ministry of Energy, Water Resources and Irrigation

977-1-421151
977-1-421153

Fax: 977-1-421151
Singha Durbar, Kathmandu, Nepi

Ref.

MESSAGE FROM THE SECRETARY

On the occasion of the 27th Annual Day, I wish to congratulate Alternative Energy Promotion Centre (AEP) for successfully executing its pivotal role, as the government's focal agency, for the promotion of renewable energy and energy efficiency. AEP's primary objective is mainstreaming renewable energy and energy efficiency in Nepal. Over the past 27 years, AEP has played a crucial role in electrifying rural areas, providing clean cooking solutions and delivering clean energy services to the households, communities and institutions benefiting more than three and a half million households.



The extensive promotion and expansion of renewable energy services have had a significant positive impact on the quality of life of people in rural and remote areas of Nepal. Decentralized renewable energy sources remain the most accessible and cost-effective energy solutions in such areas. They enhance power reliability, diversify energy sources, bolster energy security, reduce reliance on fossil fuels and contribute to reducing carbon emissions.

In the fiscal year 2079/80, AEP has achieved commendable progress. This has resulted in the electrification of more than 35,000 households and the provision of clean cooking solutions to approximately 20,000 households. Providing clean energy services to institutions and enterprises as well mobilization of climate finance and carbon revenue are also the important achievements of AEP. This progress aligns with the goals and targets set by the policies, strategies and plans of the Government of Nepal. However, reaching the most economically disadvantaged households in the remote areas remains a significant challenge where AEP is making its tireless efforts.

Renewable energy and energy efficiency form crucial components of the Ministry's White Paper (2018) with special initiatives and programs like 'Every Home Energy Home', 'Every Locality Energy Locality' Solar Mini-grid for mountainous and upper hilly regions, Clean Cooking Solutions, Grid Connected Solar Roof Tops with net metering and net payment systems among others. The establishment and operationalization of Sustainable Energy Challenge Fund under the Central Renewable Energy Fund mechanism of AEP has really contributed towards these initiatives and programs through Viability Gap Funding support to the project developers. AEP is also playing a commendable role in supporting the Provincial Governments and Local Levels in formulating policies, regulations and procedures for the promotion, development and implementation of renewable/alternative energy and energy efficiency initiatives.

I thank AEP 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, shedding light on the initiatives and achievements in AEP's areas of work.

I would also like to thank the Development Partners, Provincial Governments, Local Levels, private sector, financing institutions, civil society organizations, user groups, community organizations, AEP team and all the partners and stakeholders for their contributions towards these accomplishments during the past year. I wish for their continued cooperation, dedication and strong spirit in the years ahead.

Mr. Dinesh Kumar Ghimire
Secretary (Energy), Ministry for Energy, Water Resources and Irrigation, and
Member, Alternative Energy Development Board

ALTERNATIVE ENERGY DEVELOPMENT BOARD



Mr. Shakti Bahadur Basnet
Chairperson

Hon'ble Minister, Ministry of Energy, Water Resources and Irrigation



Dr. Prabhu Budhathoki
Vice Chairperson

Hon'ble Member, National Planning Commission



Mr. Dinesh Kumar Ghimire
Member

Secretary (Energy), Ministry of Energy,
Water Resources and Irrigation



Mr. Bhupal Baral
Member

Joint Secretary, Ministry of Finance



Ms. Chandrakala Paudel
Member

Joint Secretary, Ministry of Industry,
Commerce and Supplies



Dr. Buddi Sagar Paudel
Member

Joint Secretary, Ministry of Forests and
Environment



Mr. Kul Man Ghising
Member

Managing Director, Nepal Electricity
Authority



Mr. Devendra Raman Khanal
Member

Representative, Financial Sector



Mr. Mahesh Adhikari
Member, Representative,
Private Sector



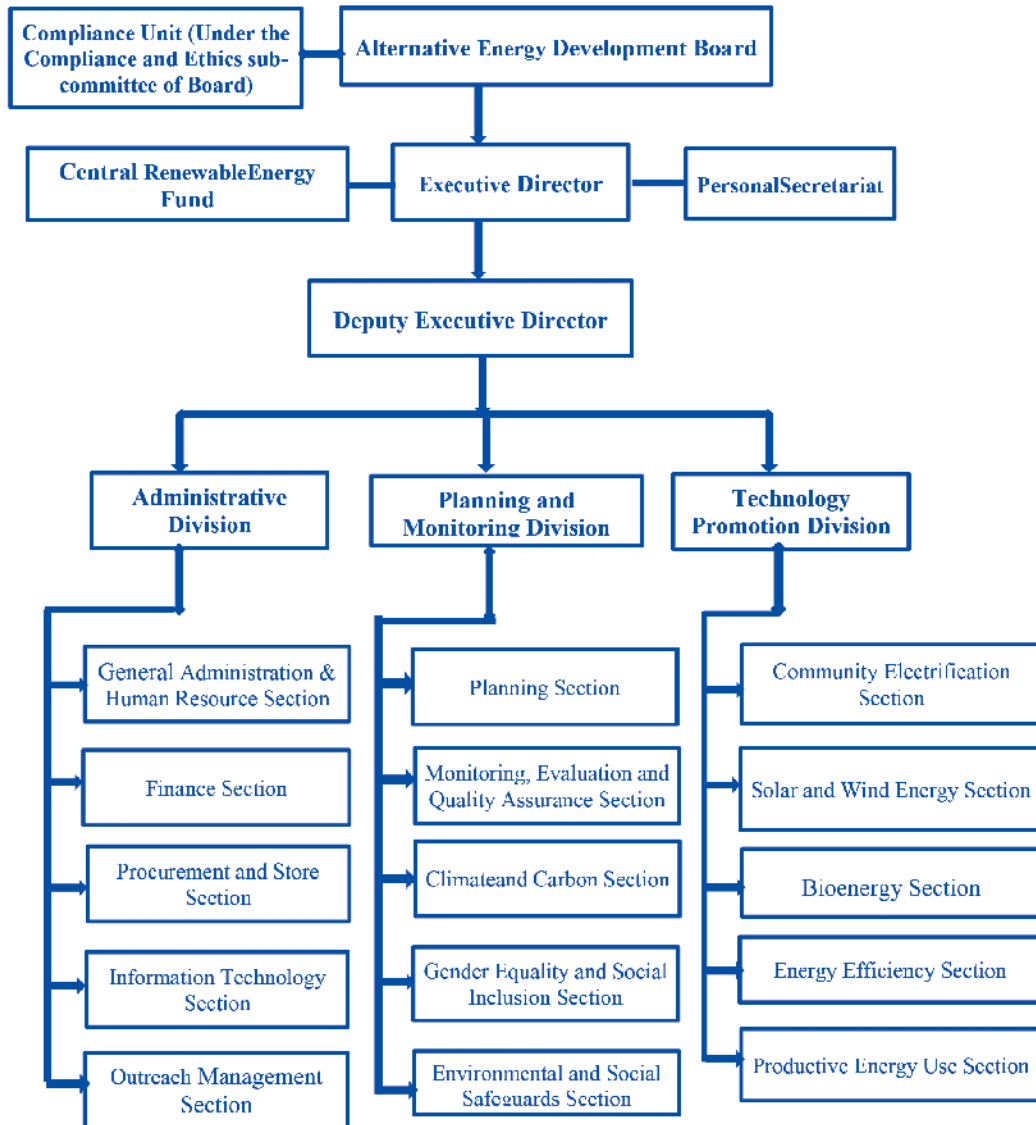
Mr. Kushal Gurung
Member

Representative, Non-Government Organization



Mr. Nawa Raj Dhakal
Member Secretary
Executive Director, AEPC

ORGANIZATIONAL STRUCTURE OF AEPCC





Government of Nepal
Ministry of Energy, Water Resources and Irrigation
Alternative Energy Development Board
Alternative Energy Promotion Center

Phone : 9771-4498013
4498014, 4498015
Fax : 977-1-4498017
Web : www.aepc.gov.np
G.P.O. Box: 14364, Kathmandu
Mid-Baneshwor, Kathmandu

EXECUTIVE DIRECTOR'S REPORT

2073

Alternative Energy Promotion Centre (AEPCC), established on 3rd November 1996 (i.e., 18th Kartik 2053 B.S.) under then Ministry of Science and Technology and now under the purview of Ministry of Energy, Water Resources and Irrigation (MoEWRI), has swiftly transformed into a nationally and internationally recognized institution. Initially tasked with promoting, developing and deploying the renewable energy technologies, with particular focus in rural and remote areas of the country, Government of Nepal (GoN) - through the Seventh Amendment of AEPCC's Formation Order in 2018 - has entrusted AEPCC with additional mandates on energy efficiency, climate and carbon, and partnering with Provincial Governments and Local Levels for effective implementation of renewable energy (RE) and energy efficiency (EE) programmes mobilizing the support from GoN, External Development Partners (EDPs) and various national and international organizations. AEPCC got accreditation as the Direct Access Entity (DAE) to Green Climate Fund (GCF) in 2019 opening up the opportunity to mobilize climate finance for implementing projects under the mitigation, adaptation and cross-cutting themes. AEPCC's experience with eight carbon projects developed under Clean Development Mechanism (CDM) builds a strong foundation for developing carbon projects under Paris Agreement and voluntary carbon market options.



AEPCC is privileged and honored for its 27 years of services to the Nepali people through access to clean, efficient, affordable and modern energy solutions at household, community, institution and enterprise levels. The achievements have contributed towards reducing dependency on traditional energy and imported fossil fuels, combating energy poverty, increasing the contribution of renewable energy into overall energy mix, improving the reliability of energy services, adopting energy efficiency, reducing carbon emissions, creating energy entrepreneurship, local economic activities and employment opportunities, reducing the gap between urban and rural lives, and ultimately improving the quality of life of the Nepali people. The Constitution of Nepal 2015 has adopted right to clean environment as the fundamental right and made provision that every citizen shall have right to live in a clean and healthy environment. The Constitution has also adopted a policy to ensure reliable supply of energy in affordable and easy manner and to make proper use of energy for the fulfilment of basic needs of citizens by generating and developing renewable energy. The state powers related with energy services are distributed among the federal, provincial and local levels as per the constitutional mandates (Schedule 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 created by the Constitution of Nepal puts emphasis in the inclusive socio-economic development and hence demands AEPCC to transform its' role and responsibility as per the restructured mandates.

The energy sector priorities, goals and commitments reflected in the policies, strategies and plans including Biomass Energy Strategy (2017), National Energy Efficiency Strategy (2018), Fifteenth Plan (2018/19-2023/24), Sustainable Development Goals: Status and Roadmap (2016-2030), MoEWRI White Paper (2018), Second Nationally Determined Contribution (2020), Grid-connected Alternative Electricity Development Guideline (2021), Renewable Energy Subsidy Policy (2021), Long Term Strategy for Net Zero Emissions (2021) and NDC Implementation Plan (2023) have prioritized the development of RE and EE. AEPCC's annual programmes and budget are guided by these documents and implemented following the GoN planning and budgeting system.

M. M. M. M.



Government of Nepal
Ministry of Energy, Water Resources and Irrigation
Alternative Energy Development Board
Alternative Energy Promotion Center

Phone : 9771-4498013
4498014, 4498015
Fax : 977-1-4498017
Web : www.aepc.gov.np
G.P.O. Box: 14364, Kathmandu
Mid-Baneshwor, Kathmandu

During the reporting period, i.e., Fiscal Year 2022/23 (2079/80 B.S.), AEPC implemented various programs and projects under two budget sub-headings: (1) Alternative Energy Promotion Centre (AEPC) incorporating targeted renewable energy and energy efficiency programs as per the priorities of GoN, where physical and financial achievements remained at 84% and 89% respectively, and (2) National Rural and Renewable Energy programme (NRREP) incorporating the programs and projects jointly funded by GoN and EDPs, where physical and financial achievements remained at 61% and 57% respectively. Central Renewable Energy Fund (CREF) of AEPC is operational to mobilize subsidy, credit and viability gap funding for the programmes and projects under NRREP. Key physical progress made in FY 2022/23 include construction of 10 mini/micro hydropower projects with total installed capacity of 1,108 kW and 8 solar minigrid projects with total installed capacity of 578 kW; installation of 14,340 solar home systems; deployment of 10,430 electric cookstoves and 3,348 metallic improved cookstoves; construction of 9,791 domestic biogas plants; 213 solar photovoltaic pumping schemes for drinking water and irrigation; and 204 institutional solar photovoltaic systems for powering remote healthcare facilities and community schools. Eight CDM projects of AEPC - developed by bundling of household biogas, micro hydropower, improved water mills and improved cookstoves - have generated around 5.96 million units of Certified Emission Reduction (CERs) till date. With the advent of Paris Agreement, development of large size biogas as carbon project is on progress for Internationally Transferred Mitigation Outcomes under Article 6.2 of the Paris Agreement. Furthermore, transition of existing CDM projects to Article 6.4 of the Paris Agreement is also on progress.

The reporting period witnessed AEPC's major achievement in terms of accessing international climate finance. The funded activity agreement of AEPC's first GCF-funded project "Mitigating greenhouse gas emissions through modern, efficient and climate-friendly clean cooking solutions (CCS)" became effective. This project aims to 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 benefiting 1 million households. Also, AEPC - as the delivery partner of National Designated Authority (NDA), i.e., Ministry of Finance (MoF) - started the implementation of GCF Readiness and Preparatory Support Programme, to enhance the capacity of country stakeholders for project pipeline development in Nepal. Development of multiple Concept Notes and Funding Proposals is on progress as a part of AEPC's project pipeline development to GCF.

In the reporting period, AEPC continued the implementation of diverse projects and programme with support from different External Development Partners (EDP). These include the Nepal Renewable Energy Program (NREP) supported by UKAid - mainly supporting development of RE and EE projects through Sustainable Energy Challenge Fund incorporated within CREF; 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 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 Renewable Energy and Energy Efficiency Program (REEEP) supported by GIZ. 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.

AEPC has been instrumental in supporting the ministry in formulating relevant policies, strategies and plans. AEPC supported ministry in merging two separate bills on RE and EE into a consolidated Renewable Energy and Energy Efficiency (REEE) Bill. The bill is currently under inter-ministerial review before being submitted to the Cabinet for forwarding to the Parliament. Furthermore, AEPC and Nepal Electricity Authority (NEA) jointly supported ministry for developing Last-mile Electrification Plan to ensure universal electricity access in the country. AEPC with support from Clean Cooking Alliance (CCA) has

The National Agency Working for Renewable Energy and Energy Efficiency



Government of Nepal
Ministry of Energy, Water Resources and Irrigation
Alternative Energy Development Board
Alternative Energy Promotion Center

Phone : 9771-4498013
4498014, 4498015
Fax : 977-1-4498017
Web : www.aepc.gov.np
G.P.O. Box: 14364, Kathmandu
Mid-Baneshwor, Kathmandu

developed Country Action Plan on Clean Cooking to transform the cookstoves and fuel market in Nepal. AEPC has been collaborating with the Provincial Governments in all provinces, particularly with the ministry overseeing the energy portfolio, for the planning and implementation of RE and EE activities. Likewise, AEPC has been extensively collaborating with Local Levels and their associations – National Association of Rural Municipalities in Nepal (NARMIN) and Municipal Association of Nepal (MuAN) – for planning and implementation of RE and EE activities. In addition, AEPC has also been coordinating and collaborating with several relevant international/national partners, stakeholders and initiatives in its endeavors.

As we look forward, the GoN aims to achieve universal electricity access within the next two years and the Last-mile Electrification Plan has fittingly adopted an action plan where AEPC and NEA complement each other for electrifying the remaining areas. However, major challenge in executing the plan has been the limited availability of resources. Furthermore, in the remote areas which have been electrified mainly through mini/micro hydropower projects, natural disasters like flood, landslide and earthquake have been causing damage to these projects in a large number every year. Subsequently, this has resulted in AEPC receiving a large number of requests for rehabilitation of such mini/micro hydro projects from Local Levels and the project developers/communities. Likewise, arranging the required resources has been a major constraint to transform the existing mini/micro hydro projects into sustainable social enterprises by making them technically sound, climate resilient and institutionally robust thereby enhancing livelihood options and resilience of the communities.

Despite these challenges, several opportunities exist for the rapid expansion of RE and EE through new funding windows provided by international climate financing mechanisms. As we mark our 27th anniversary, we reflect on our numerous achievements, which have been made possible through the continuous financial and technical support from the GoN and EDPs, the dedication of our staff, and the involvement of sub-national governments, private sector and local communities. These stakeholders have played a pivotal role in expanding access to electricity and clean cooking solutions for the majority of the population. Over the years, AEPC has supported around 15 million people throughout the country in meeting their energy needs through the deployment of appropriate RE solutions through technical assistance, subsidies, credit and viability gap funding. More than 500 companies and numerous local communities have taken the lead in service delivery, creating direct and indirect employment opportunities for over 30,000 individuals. Ultimately the achieving and scaling up of our targets and commitment can accelerate Nepal's transition to a climate resilient energy system and increase the possibilities to shape prosperous and fulfilling lives. AEPC is committed to underpin the activities in the area of universal access to electricity, clean cooking solutions, waste to energy, productive energy use, energy mix and reliability, energy transition, energy efficiency, capacity building of national stakeholders and mobilizing national and international finance for meeting the national goals and targets.

Finally, AEPC would like to extend our heartfelt gratitude to the GoN, Ministry, Provincial Governments, Local Levels, EDPs, Private Sector, Financial Institutions, Civil Society Organizations, Academia, Local Communities, User Groups, Project Developers and all the partners and stakeholders for the long-standing partnership with AEPC and look forward to continued cooperation and collaboration in the days ahead.

Nawa Raj Dhakal
Executive Director

ABBREVIATION AND ACRONYMS

AEPC	Alternative Energy Promotion Center
AEDB	Alternative Energy Development Board
BAT	Best Available Technology
BAU	Business as Usual
BDS	Business Development Services
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 and Social Inclusion
GHG	Greenhouse Gas
GoN	Government of Nepal
ICS	Improved Cooking Stoves
IEA	International Energy Agency
ISPS	Institutional Solar Photovoltaic System
IWM	Improved Water Mills
KfW	German Development Bank
kW	Kilowatt
kWh	Kilowatt Hour
LBG	Large Biogas
LFI	Local Financial Institutions
LPG	Liquefied Petroleum Gas
MEP	Municipal Energy Plan
MGEAP	Nepal Private Sector-Led Mini Grid Energy Access Project
MHDF	Micro Hydro Debt Fund
MHP	Micro Hydro Projects
MICS	Metallic Improved Cooking Stoves
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
NAMA	Nationally Appropriate Mitigation Action
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
RA	Reverse Auctioning
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
TPD	Tons Per Day
TWh	Terra Watt Hour
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
USD	United State Dollars
WECS	Water and Energy Commission Secretariat

TABLE OF CONTENT

MESSAGE FROM THE CHAIRPERSON	
MESSAGE FROM THE SECRETARY	
ALTERNATIVE ENERGY DEVELOPMENT BOARD	
ORGANIZATIONAL STRUCTURE	
MESSAGE FROM THE EXECUTIVE DIRECTOR	
ABBREVIATION AND ACRONYMS	

CHAPTER 1:	ENERGY SECTOR OVERVIEW	2
1.1	THE CONTEXT	3
1.2	NATIONAL ENERGY CONSUMPTION SCENARIO	4
1.3	SECTORAL EVOLUTION	4
1.4	PREVAILING POLICY AND LEGAL FRAMEWORK	6
CHAPTER 2:	ALTERNATIVE ENERGY PROMOTION CENTRE	12
2.1	INTRODUCTION	12
2.1.1	Mandate	12
2.1.2	Vision Statement	12
2.1.3	Mission Statement	13
2.1.4	Strategic Objectives	13
2.2	AEPC's WORKING APPROACH	13
2.2.1	Working Modality	13
2.2.2	Promotion of Renewable Energy	14
2.2.3	Outreach	14
2.2.4	Promotion of Productive Energy Use	14
2.2.5	Financing Instruments and Mechanism	15
2.2.6	Compliance and Ethics	15
2.2.7	Environmental and Social Safeguards	16
2.2.8	Energy Efficiency	16
2.3	HUMAN RESOURCE	16
2.4	SECTORAL POLICIES	16
2.5	Cumulative Achievements	17
CHAPTER 3:	PROGRAMS AND PROJECTS	20
3.1	SPECIAL AND TARGETED RE AND EE PROGRAMME	20
3.2	NATIONAL RURAL AND RENEWABLE ENERGY PROGRAM (NRREP)	20
3.3	MAJOR PROGRAMS/PROJECTS IMPLEMENTED UNDER NRREP	21
3.3.1	South Asia Sub-regional Economic Cooperation (SASEC)	21
3.3.2	Renewable Energy for Rural Livelihood (RERL) Project	22
3.3.3	Renewable Energy and Energy Efficiency Programme (REEEP)	23
3.3.4	Micro Hydro Debt Fund	23
3.3.5	Biogas Credit Fund	23
3.3.6	Nepal Renewable Energy Program (NREP)	24
3.3.7	Nepal Private Sector-Led Mini Grid Energy Access Project (MGEAP)	24
3.3.8	Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal (AEPC/KFW-DKTI Solar Project)	25

	3.3.9 AEPC Engagement with Green Climate Fund (GCF)	25
	3.3.9.1 Mitigating Greenhouse Gas Emissions through Modern, Efficient and Climate-friendly Clean Cooking Solutions	26
	3.3.9.2 GCF Readiness and Preparatory Support Program:	26
CHAPTER 4:	PROGRESS OVERVIEW	28
4.1	ALLOCATION AND DISURSEMENTS	28
4.2	PHYSICAL PROGRESS	29
	1.2.1 Mini & Micro Hydro and IWM Related Activities	29
	1.2.2 Solar Energy Related Activities	29
	4.2.3 Bioenergy	30
	4.2.4 Energy Efficiency	31
4.3	GIS MAPS RENEWABLE ENERGY TECHNOLOGIES	32
CHAPTER 5:	PROGRESS OF CROSS CUTTING ACTIVITIES	38
5.1	CARBON FINANCING ACTIVITIES	38
	5.1.1 Carbon Projects	38
	5.1.2 CDM Audits	39
5.2	GENDER AND SOCIAL INCLUSION	40
5.3	ENVIRONMENT AND SOCIAL SAFEGUARDS	40
5.4	COMPLIANCE RELATED ACTIVITIES	40
5.5	MONITORING AND QUALITY ASSURANCE	40
5.6	OUTREACH MANAGEMENT	40
5.7	TRAINING AND CAPACITY BUILDING	41
CHAPTER 6:	RENEWABLE ENERGY RESULT AREAS	44
6.1	ACCESS TO CLEAN ENERGY	44
6.2	SUSTAINABLE DEVELOPMENT BENEFIT	44
6.3	GREEN-HOUSE GAS EMISSION REDUCTION	45
6.4	SUCCESSFUL CASE STUDIES	46
CHAPTER 7:	PROBLEMS, CHALLENGES AND LESSONS LEARNT	50
7.1	SECTORAL CHALLENGES	50
7.2	INHERENT PROBLEMS AND CHALLENGES OF AEPC	51
7.3	LESSONS LEARNT IN THE REPORTING PERIOD	51
7.4	OPPORTUNITIES AND WAY FORWARD	52
ANNEXES		
Annex 1	Progress achieved for the programs/activities implemented with financing from government budget 2079/80 (2022/23)	56
Annex 2	Progress achieved for the programs/activities implemented under NRREP2079/80 (2022/23)	57
Annex 3	District wise installed RETs 2079/80 (2022/23)	58



**Welcoming newly appointed honorable Minister, Mr. Shakti Bahadur Basnet
(Ministry of Energy, Water Resources and Irrigation) at AEPC Office.**

ENERGY SECTOR OVERVIEW

1.1 THE CONTEXT

Energy plays a paramount role as a global commodity and serves as a fundamental pillar for socio-economic and human development. Given the substantial impact of energy on both economy and overall welfare of society, ensuring access to clean and cost-effective energy remains a matter of utmost significance.

In 2022, primary energy demand growth slowed compared to 2021, increasing by 1.1% (6.6 EJ) instead of the 5.5% (30.9 EJ) seen in the previous year. In 2022, primary energy consumption exceeded the pre-COVID 2019 levels by 16.6 EJ, with consumption rising in all regions except Europe (-3.8%) and the Commonwealth of Independent States (CIS) (-5.8%). Non-OECD countries saw a significant increase of 20.5 EJ in primary energy consumption compared to their 2019 pre-COVID levels, primarily driven by China, which accounted for 72% of this increase with 14.6 EJ. In contrast, primary energy demand in OECD countries decreased slightly, reaching 234 EJ in 2022 compared to 238 EJ in 2019. The rise in primary energy supply between 2019 and 2022 was mainly due to renewable energy sources (excluding hydro) contributing 13.5 EJ, coal providing 10.6 EJ, and an increase in gas production of 2.7 EJ. Emissions originating from energy sources experienced a robust resurgence, reaching an all-time peak of 39.3 billion

tonnes of carbon dioxide equivalent, signifying a 0.8% rise compared to 2021. The proportion of fossil fuel consumption in relation to primary energy sources remained constant at 82% in 2022 as well. Energy-related emissions accounted for 87% of the overall global emissions. 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 2022, renewable power (excluding hydro) increased by 14%, reaching 40.9 EJ. This growth rate was slightly lower than the 16% increase observed in the previous year. Solar and wind capacity continued to expand rapidly in 2022, with a record addition of 266 GW. Among these additions, solar accounted for the majority at 72%, representing 192 GW of the capacity increase. China played a significant role in the growth of both solar and wind energy, accounting for approximately 37% of global capacity additions for solar and 41% for wind. Hydroelectricity generation experienced a modest increase of 1.1% in 2022, while nuclear power output declined by 4.4%.

In 2022, global electricity generation increased by 2.3%, which was a lower growth rate compared to the previous year's 6.2%. Wind and solar energy sources reached a record high, accounting for 12% of the total power generation. Solar power saw a remarkable 25% growth in output,

while wind power experienced a 13.5% 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 2022, maintaining a steady share of around 35.4%, slightly lower than the 35.8% in 2021. Natural gas-fired power generation remained consistent in 2022, holding a share of approximately 23%.

Renewable energy sources (excluding hydro) met 84% of the net electricity demand growth in 2022¹.

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 overall 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 thoughtfully to bridge this gap in the future. In the Business-as-Usual 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 electricity consumption in this Business-as-Usual (BAU) scenario from 2015 to 2040².

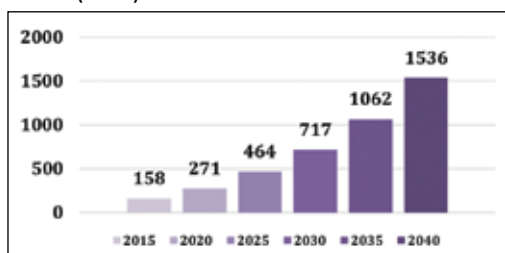


Figure 1: Projection of Electricity Consumption for 2015-2040 in kWh, (adapted from WECS, 2017)

1 Statistical Review of World Energy, 2023, 72nd edition
 2 Water and Energy Commission Secretariat (WECS), 2017: Electricity Demand Forecast Report (2015-2040).

1.2 NATIONAL ENERGY CONSUMPTION SCENARIO

In the country, still households exhibit a stronger preference for solid fuels, primarily firewood, as their main source of cooking fuel. Following this, the use of Liquefied Petroleum Gas (LPG) is also common. Traditional Cookstoves (TCS) are predominantly employed for cooking purposes in rural areas, whereas LPG emerges as the prevalent cooking technology in urban and peri-urban regions. Furthermore, LPG needs to be imported, and in the fiscal year 2021/22, Nepal imported 536,028 metric tons of LPG, marking a 195% increase since 2011/12³. This heavy reliance on LPG imports 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 LPG.

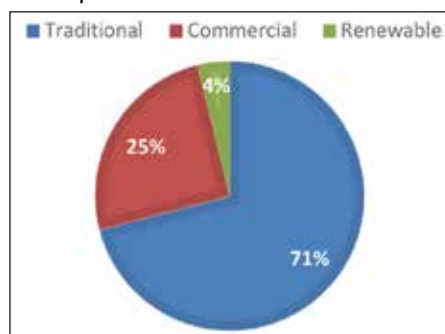


Figure 2: Energy Consumption Status 2022/23 first eight months, (adapted from MoF, Economic Survey, 2079/80)

Nevertheless, the significant dependence of households on traditional energy sources, namely solid fuels, continues to be a cause for concern. The breakdown of energy consumption by type reveals that conventional sources account for 71

3 Nepal Oil Corporation (NOC), 2022 <http://noc.org.np/import?type=import&offset=0&max=10>

percent, commercial sources for 25 percent, and renewable sources for a mere 4 percent of the total energy consumption. Figure 2 illustrates the energy consumption patterns by fuel type during the first eight months of the fiscal year 2022/23, as reported in the Economic Survey of 2079/80 B.S. by the Ministry of Finance.

1.2.1 National Electrification Status Access

As of mid-March 2023, the percentage of the population with access to grid electricity has reached 95.03 percent according to economic survey 2023. Comparatively, total electricity generation has increased by 21.7 percent since the last fiscal year, now standing at 2,666 megawatts (MW). Out of this, hydroelectricity contributes 2,449 megawatts, solar plants generate 75.04 megawatts, sugarcane mills cogeneration produce 6 megawatts (as reported in the Economic Survey of 2079/80 B.S. During the same period, i.e., up to mid-March of the fiscal year 2022/23, 382.5 kilowatts (KW) of micro and small hydropower capacity and 867 KW from solar and wind projects have been put into operation. Furthermore, 6,374 biogas plants and 3,585 solar home systems have been successfully installed.

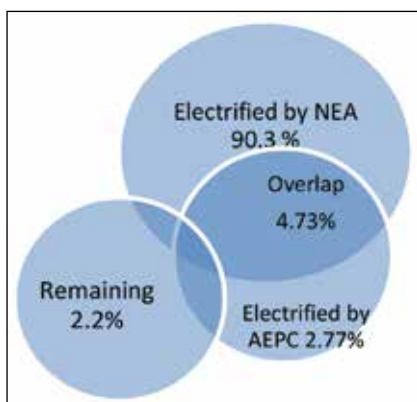


Figure 3: Electricity Access Data

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 cooking stoves (ICS), small water turbines, and enhanced water mills (IWM). To achieve the goals outlined in these policies, the plan introduced a strategy involving the private sector and the provision of grants or loans to consumers to effectively promote these technologies. Furthermore, the plan placed significant emphasis on research, studies, and the development of technical expertise. It marked the introduction of subsidies for technology adoption (such as biogas, ICS, IWM, and small turbines) as well as for research and training efforts.

The eighth plan, spanning from 1992 to 1997, represents the first plan of Nepal's democratic government following the restoration of democracy in 1990. This plan upheld the alternative energy agenda established by its predecessor and recognized the necessity of establishing an agency dedicated to alternative energy to oversee and coordinate various energy-related initiatives. It placed a strong emphasis on rural electrification, with a focus on generating electricity through micro-hydro projects. The plan also formalized the framework for the development of various alternative energy sources, including micro-hydro, biogas, solar, wind, and biomass energy. The eighth plan envisioned the implementation of the alternative

energy development program through the active involvement of the private sector. The program was designed to be executed in close collaboration with entities such as the Agricultural Development Bank, other financial institutions, private sector entities, and non-government organizations. Additionally, the plan continued to allocate government funding to support the alternative energy sector. During the Ninth Plan period, which extended from 1997 to 2002, the development of rural energy was acknowledged as a means to create more employment opportunities. The primary objective was to build a strong economic foundation, improve living standards in rural areas, and ensure environmental sustainability. To achieve these goals, the plan implemented a policy that encouraged the active involvement of the private sector, as well as national and international non-governmental organizations, in the research and development of rural and alternative 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 improved cooking stoves (ICS), micro-hydro projects, solar energy, and other isolated renewable energy 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 renewable energy technologies. It embraced a long-term vision aimed at accelerating economic growth, increasing employment opportunities, and ensuring environmental sustainability. 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 renewable energy 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 renewable energy 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 renewable energy 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 renewable energy technologies as Clean Development Mechanism (CDM) projects, capitalizing on their potential to reduce greenhouse gas 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 renewable energy 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 rural energy.

The Three Year Plan for the period 2010 to 2013 embraced a long-term vision aiming to achieve a 10% contribution of renewable energy 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 renewable energy 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 renewable energy-based enterprises, and the grid interconnection of renewable energy projects.

The Thirteenth Plan, covering the period from 2013 to 2016, implemented a strategy that focused on research and development, along with the transfer of renewable energy technologies. 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 renewable technologies. Furthermore, one of the key objectives of the plan was to empower local bodies to plan, execute, monitor, and evaluate activities related to renewable energy. Additionally, it introduced policies to put into operation the Central Renewable Energy Fund (CREF), manage the disposal of used batteries generated from solar-based technologies, and utilize solar and wind technologies for water pumping purposes, among other initiatives.

The Fourteenth periodic 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 improved cooking stoves (NPC, 2016)⁴.

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

⁴ National Planning Commission (NPC), 2016: The Fourteenth Plan (2016/17-2018/19)

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 sources⁵. Consequently, this constitutional framework obligates the government to create and execute policies and strategies focused on the promotion of renewable energy 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.

Nationally Determined Contributions (NDC) (2016) of Nepal primarily emphasize the advancement of renewable energy and energy efficiency as 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) endorsed during a cabinet meeting on November 19, 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 energy efficiency through the effective implementation of energy efficiency programs, establishing a policy, legal, and institutional framework. The ultimate **goal** is to double the average rate of energy efficiency 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)⁶ outlines the status of renewable energy 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 (AEPCC) to become a "Center for Excellence" in the renewable energy sector. Another key focus is the establishment of a national carbon market for renewable energy, given priority within the paper.

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 specific areas, including agriculture and food security, forest and biodiversity

5 The Constitution of Nepal (2015)

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

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 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. It was released in August 2019 and replaces the 2011 Climate Change Policy of Nepal, which primarily aimed to reduce greenhouse gas emissions by encouraging the adoption of clean energy sources such as hydroelectricity, renewables, and alternative energies, as well as by improving energy efficiency and promoting the use of green technologies.

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

losses and damages associated with disasters.

Fifteenth Periodic Plan has been adopted by the GoN in FY 2019/20 and up until 2023/24. The plan envisions mitigating the impacts of climate change and aims to bolster society's resilience while minimizing adverse consequences, ultimately fostering a sustainable society. It outlines a strategy and operational policy to harness resources from carbon financing and other climate funding sources, including the Green Climate Fund, to promote renewable energy in Nepal. The plan's objectives include achieving a 12% contribution of renewable energy to the total energy mix and undertaking various initiatives, such as installing 0.2 million household biogas plants, 0.5 million improved cooking stoves and thermal gasifiers, producing 20 thousand metric tons of bio briquettes and pellets annually, implementing two additional carbon projects, and replacing 40 thousand metric tons of liquefied petroleum gas through the installation of 500 large biogas plants.

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 renewable energy sources, signifying a substantial shift away from fossil fuels. Additionally, in the realm of transportation, Nepal plans to make substantial strides by targeting 25% electric vehicles on the roads 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. To achieve this, the plan includes installing 500,000 improved cook stoves 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 and promoting renewable energy 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 Renewable Energy 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%).





Mr. Dinesh Kumar Ghimire, Secretary (Energy), Ministry of Energy, Water Resources and Irrigation, together with relevant officials and local people during inauguration of Sunkoshi Kakani Solar Minigrid Project (70 kWp) at Sunkoshi Rural Municipality, Okhaldhunga

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 (AEPCC) on November 3, 1996. AEPCC operates under the jurisdiction of the Ministry of Energy, Water Resources, and Irrigation. 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 AEPCC's Board serves as the highest governing body responsible for the overall management and oversight of the activities undertaken by AEPCC in pursuit of its mission.

2.1.1 Mandate

AEPCC's responsibilities encompass the encouragement and advancement of various renewable energy sources, including micro/mini hydro projects

with capacities of up to 10 MW, solar energy, wind energy, biomass energy, biogas, and even sulfur spring-based energy. Through the Seventh Amendment of the AEPCC Formation Order 2053 (1996), AEPCC's role and functions have been expanded significantly. In addition to its traditional responsibilities, AEPCC 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 renewable energy and energy efficiency.

2.1.2 Vision Statement

AEPCC aims to establish itself as a prominent institution with regional and international recognition, serving as a model for the widespread adoption of sustainable renewable energy practices. It also seeks to become a key national entity for mobilizing resources. The primary objective is to elevate AEPCC's profile as an actively engaged institution in the promotion of RETs within the region.

2.1.3 Mission Statement

To make renewable energy mainstream resource through increased access, knowledge and adaptability contributing for the improved living conditions of people in Nepal.

1.1.4 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.

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 renewable energy 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.

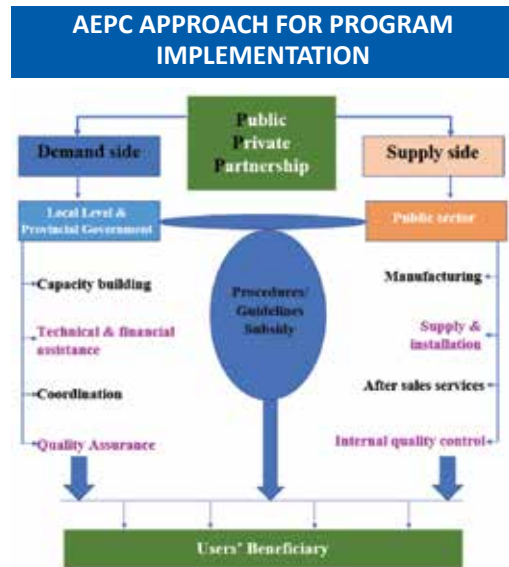


Figure 4: PPP Model of Renewable Energy Service Delivery

Local Government

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

At the national level, AEPC collaborates closely with relevant ministries, their respective departments, non-governmental organizations, the private sector, civil society, national financial institutions, academic institutions, and community/user groups to advance the development and promotion of RETs in Nepal. Over the course of 26 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 environmental funding sources.

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 for the Green Climate Fund in implementing the GCF Readiness and Preparatory Support Program, acting on behalf of the Ministry of Finance. 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;
- Biogas;
- Biomass and Bio-fuels;
- 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 cook-stoves have already been incorporated into the CDM portfolio. AEPC is progressively strategizing to introduce additional RETs in alignment with the Paris Agreement.

2.2.3 Outreach

The outreach function within the

current federal context plays a crucial role. This function at AEPC has effectively facilitated the signing of with all seven provincial levels. It places a strong emphasis on building capacity and providing orientation on Renewable Energy (RE) at the provincial and local levels. Ultimately, it offers technical assistance to provincial and local authorities in the planning, development, implementation, and monitoring of Renewable Energy Programs.

To support local governments, 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, taking into account the life cycle cost of various energy options, including grid extension, mini/micro hydro, solar PV/thermal, biomass, and biomass.

2.2.4 Promotion of Productive Energy Use

Promoting productive energy use (PEU) aims to transform the provision of Renewable Energy (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

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 renewable energy 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 renewable energy project area. This, in turn, enhances people's capacity to afford and invest in renewable energy 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 energy components 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 Renewable Energy Technologies (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 and credits to the renewable energy sector.

The financial management mechanism

of CREF is implemented through private commercial and development banks chosen through a transparent and competitive selection process, based on well-defined eligibility criteria. The Handling Bank takes on critical roles, including wholesale lending to qualified Partner Banks, managing the Subsidy Fund, 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 renewable energy 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.

In the reporting period, with the support of the British Embassy Kathmandu-funded Nepal Renewable Energy Programme (NREP) spanning 4.5 years, the Government of Nepal is executing a Sustainable Energy Challenge Fund Financial Assistance for Distributed Renewable Energy Projects.

2.2.6 Compliance and Ethics

AEPC has implemented the Compliance Unit throughout 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 AEPC 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. This sub-committee, led by one Board member, is responsible for supervising internal controls, ethical considerations, and internal audits within AEPC. Other members of the sub-committee include a joint secretary from the legal department and an under-secretary from the finance section of the relevant ministry, as well as independent legal and finance experts. 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 National Energy Efficiency Strategy 2018 was embraced, AEPC was appointed as the government entity responsible for energy efficiency (EE) efforts in Nepal. AEPC is now responsible for advancing energy efficiency 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 team, AEPC also engages a group of specialists in renewable energy, environmental safeguards, social safeguards, gender equality, and climate change for various projects and programs it carries out.

2.4 SECTORAL POLICIES

Since its inception, AEPC has evolved into a dynamic organization actively providing renewable energy and energy efficiency services to its intended beneficiaries. AEPC has consistently played a leading role in assisting the government in crafting essential plans, policies, and strategies needed to integrate renewable energy into Nepal's mainstream energy supply and adopting energy efficiency 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

2.5 Cumulative Achievements

AEPC has actively advocated for renewable energy adoption, encompassing various technological solutions in both rural and urban settings. Over its 27-year history, AEPC has assisted more than 14

million individuals (note that a single beneficiary may have been counted up to four times, depending on the number of different renewable energy technologies they received) throughout the nation in meeting their renewable energy requirements. This support has been made possible through the strategic provision of technical assistance, subsidies, and credit financing. The table below outlines the quantity of renewable energy technologies promoted by AEPC during the reporting period.

Table 1: Cumulative achievement in technology promotion

Program	Unit	Achievement
		Up to FY 2022/23
Micro/Mini Hydro	kW	38,842
Solar Mini grid Solar/Wind Min-grid System	kW	2707
Solar Drinking Water and Irrigation Pump	Nos.	3,342
Institutional Solar PV System	Nos.	4,021
Roof top solar	kW	10,080
Solar Home System	Nos.	988,341
Domestic Biogas	Nos.	449,338
Institutional, Urban and Commercial Biogas Plant	Nos.	357
Portable Metallic stoves	Nos.	109,635
Metallic ICS	Nos.	18,068
Electric/induction cook stoves	Nos.	33,129
Solar installed at religious place and homestay	Nos.	4,511
Solar street lights	Nos.	3,309
Improved Water Mill (IWM)	Nos.	11,104
Mud Improved Cooking Stoves (ICS)	Nos.	1,423,242
Institutional Gasifier	Nos.	33
Solar Dryer and cooker	Nos.	2,464

AEPC has consistently upheld its commitment to providing renewable energy services to the populace, fostering enduring partnerships with crucial External Development Partners (EDPs). 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 30,000 individuals. This development has given rise to a thriving renewable energy market, which has effectively permeated every corner of the country.





Dhorpatan Bhuji Khola MHP (60 kW) at Dhorpatan Municipality-9, Baglung

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 renewable energy development and 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 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 (NRREP)

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 renewable energy 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, the GoN continued its commitment to developing the renewable energy sector 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 renewable energy initiatives, engaging stakeholders, and facilitating the mobilization of financial resources.

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 (SASEC)

The 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 renewable energy supply. 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 renewable energy 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 renewable energy 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 National Rural and Renewable Energy Program's (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 (RERL) Project

The Renewable Energy for Rural Livelihood (RERL), a joint project of United Nations Development Programme (UNDP) Nepal and AEPC, was initiated in 2011, after successful completion of Rural Energy Development Programme (REDP). In 2014, Global Environment Facility (GEF) and UNDP supported GEF-RERL for 5 years with the total budget of USD 5 million, USD 3 million provided by GEF as part of its Climate Mitigation Portfolio and USD 2 million by UNDP. The project worked towards removal of technological, financial, institutional and regulatory barriers for large-scale deployment of renewable energy systems in Nepal. In this way, GEF-RERL played a pivotal role in various aspects, including the development of Municipal Energy Plans, development of technical and institutional guidelines, establishment of financial instruments such as Vendor Financing Mechanism, Vendor Challenge Fund and Credit Guarantee Mechanism at CREF to reduce risks for private investors, which have been crucial in achieving financial closure of ADB funded South Asia Subregional Economic Cooperation (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). 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 renewable energy 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.

As of October 2023, 4 MHPs with the total capacity of 1100kW and 9 SMGs with a total capacity of 565kW under SASEC are providing electricity to 5,271 households. Besides, 1500 households were provided solar home systems after the earthquake of 2015 in off-grid areas. Further, 3 MHPs of 2.496 MW are at different stages of construction and the procurement process of 750kW Anke Khola MHP is in the final stage. Likewise, RERL is also supporting communities to establish institutions – users' groups or cooperatives or company - to sustainably manage their renewable energy systems. Further, for meaningful participation of women in management of energy projects and optimization of benefits from access to electricity, they are encouraged to engage in Saving & Credit activities, more than 700 women have benefited by investing in different income generating activities.

Furthermore, RERL, through UNDP, has mobilized additional resources from the Government of Japan under the Japan Supplementary Budget for the implementation of the Japan-UNDP Support for Transition Effort to Decarbonization (JUSTED) project. The main objective of JUSTED is to leverage Nationally Determined Contributions (NDCs) to achieve net-zero emissions and climate-resilient

development in response to the climate emergency. These activities align with Nepal's commitments to achieving SDGs (Goal 7) and will support Nepal in implementing its commitments under the NDC, paving the way for a green economic recovery that contributes to achieving SDGs by 2030. This support is carried out through the RERL project, with AEPC as the implementing partner.

The project has supported rural communities in Sarlahi and Siraha districts of the Madesh Province to install solar pumping systems in 7 drinking water projects benefiting about 10,900 people from 2,325 households. Moreover, the project also supported to install 29 kWp solar power backup systems in 11 health facilities, including birthing centers that cater to a total population of 41,676 including 20,142 women. Additionally, 950 students are benefiting from solar power backup systems that were installed in 2 schools. These initiatives contribute to ultimately uplifting the overall well-being of needy population and for enriching the learning experience of children.

3.3.3 Renewable Energy and Energy Efficiency Programme (REEEP)

The Deutsche Gesellschaft für Internationale Zusammenarbeit (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 Ministry of Energy, Water Resources, and Irrigation. The primary goal of REEEP is to enhance the conditions necessary for planning and implementing energy-efficient measures in Nepal. This program aims to establish the regulatory, institutional, and private-sector frameworks for the widespread adoption of renewable energy and improvements in energy efficiency. REEEP adopts a multi-level approach comprising four key components: Output 1 focuses on creating a policy, institutional, and regulatory framework for Renewable Energy (RE) and Energy Efficiency (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; and Output 4 concentrates on disseminating results and knowledge in the field of RE and EE.

3.3.4 Micro Hydro Debt Fund

The Micro Hydro Debt Fund (MHDF) was created with the assistance 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 (SCOs), and rural development banks (RDBs). These intermediaries then grant sub-loans to farmers who are unable to cover the full cost of a biogas plant with their own funds. The initial seed fund for this initiative amounted to 5 million EURO. Presently, over 300 LFIs/MFIs are actively involved in facilitating the disbursement of credit to biogas users.

3.3.6 Nepal Renewable Energy Program (NREP)

The NREP is a program spanning four and a half years, with a total budget of £9.2 million, funded by DFID as part of the Climate Smart Development for Nepal initiative. 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 Ministry of Energy, Water Resources and Irrigation (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 renewable energy, ensuring the supply of renewable energy technologies, and providing financial support for renewable energy initiatives.
4. Generate and share knowledge and research pertaining to Nepal's renewable energy 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 (MGEAP)

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.

- Up gradation 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.

3.3.8 Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal (AEPC/KFW-DKTI Solar Project)

AEPC is executing a project “Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal” 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, 390 kWp (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 AEPC Engagement with 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 support developing countries raise and realize their Nationally Determined Contributions (NDC) ambitions towards low-emissions, climate-resilient pathways.

AEPC initiated the accreditation process in 10th March, 2017 with the application submitted for the accreditation process. The 22nd Board 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) Enhancing energy access by generating energy from the waste for mitigating climate

change (iii) Sustainable, Climate Resilient and Community based Micro hydropower Social Enterprises for the rural mountains of Nepal (iv) National solar mini grid programme for low carbon economic development which are at the concept note preparation stage. Further projects at project idea stage include (v) Powering health and education for enhancing the access to energy and adapting to climate change (vi) Improvement of quality and reliability of the renewable energy solution for mitigation and adaptation to climate change (vii) Improvement of energy efficiency in industrial enterprises (viii) Building Energy Efficient Cities (ix) Climate Resilient Housing

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 the cost 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 as the delivery partner to implement the GCF Readiness and Preparatory Support Program. The Green Climate Fund (GCF) Secretariat approved Readiness Proposal initially submitted on 2 November 2020, with the Alternative Energy Promotion Centre (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. There are several opportunities for AEPC to access the readiness fund under different funding windows of GCF for future.





**Welcoming newly appointed Executive Director,
Mr. Nawa Raj Dhakal, at AEPC office.**

PROGRESS OVERVIEW

In the fiscal year 2022/23, AEPC promoted renewable energy technologies using two distinct approaches: the first involved the targeted renewable energy program, funded exclusively by the Government of Nepal (GoN); the second was the Nepal Rural Electrification Program (NRREP), jointly financed by the GoN and other development partners (EDPs). During the reporting period of 2022/23, projects carried out under the targeted renewable energy program achieved 84% of their physical goals and 89% of their financial targets. Likewise, in the case of NRREP, the physical progress reached 61%, and the financial progress reached 57%.

Table 2: Annual progress of AEPC implemented programs

SN	Programs	Progress	%
2022/23			
1	Targeted RE and EE program (GoN Financed)	Physical	84%
		Financial	89%
2	NRREP	Physical	61%
		Financial	57%

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 2022/23, the Government of Nepal (GoN) allocated approximately 61% of the total budget for program implementation through these two channels, namely the targeted Renewable Energy Program and NRREP. The remaining funding was secured through foreign investments, comprising 33% in the form of grants and 6% as loans.

In the fiscal year 2022/23, AEPC received a total budget of NPR 2628.25 million for both of its program routes, out of which it expended NPR 1844.10 million. The overall financial achievement for AEPC in the fiscal year 2022/23, covering both programs, reached 70.16%. Specifically, the financial progress for the targeted Renewable Energy program implemented by AEPC during this period was at 89.03%, while the progress under the NRREP reached approximately 60.59%.

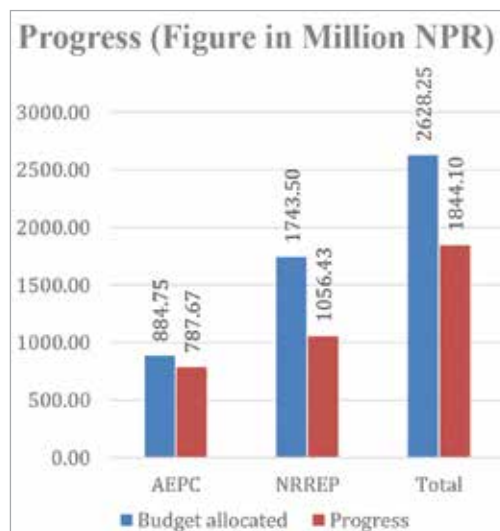


Figure 5: Budget allocated and the progress (in million NPR) (FY 2022/23)

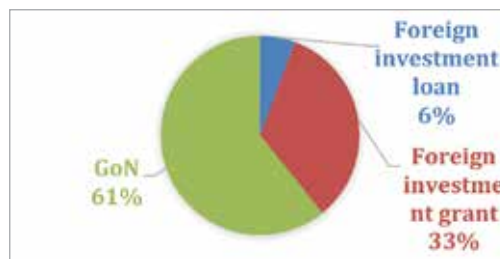


Figure 6: GoN allocation and Foreign Investment (Grant and Loan) in total RE budget in 2022/23

4.2 PHYSICAL PROGRESS

The details of the progress made in terms of physical accomplishments during the specified time frame are provided above. 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 2022/23 aimed to generate 1500 kW of electricity by utilizing Pico/Mini/Micro hydro and Micro hydro installations as part of the SASEC program. During the evaluation period, a total of 1108 kW of electricity was successfully generated through these two initiatives. Notably, the Pico/Mini/Micro hydro achieved 102% of its target under GoN regular budget, while the Micro hydro installation under the SASEC program reached a commendable 64% of its intended goal.



Figure 7: Dunsel Jharana Micro Hydro Project (88 kW)



Figure 8: Inside view of 200 kW Giri Khola MHP

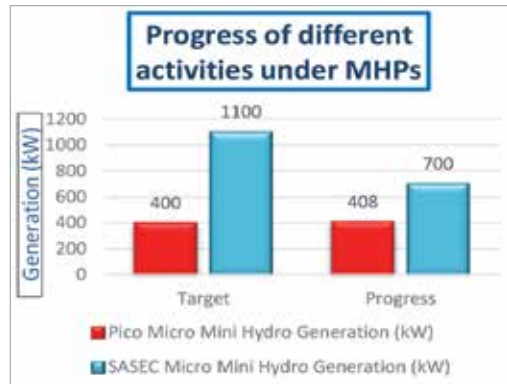


Figure 9: Progress of key micro hydro related activities

4.2.2 Solar Energy Related Activities

In the 2022/2023 period, concerning advancements in solar energy-related initiatives, there were notable accomplishments. Specifically, the installation of solar pumping systems for irrigation to support commercial agriculture surpassed the intended goal of 175, achieving a total of 213 installations. Additionally the multi-year electricity generated from the mini-program reached 578 kW out of the 800 kW target.

On the installation of institutional solar photovoltaic system for various institutions, out of 300 institutions targeted, 204 benefitted through the activity. Solar home system for un-electrified areas achieved 120% progress reaching 14,340 households compared to 12,000 targeted.

The Nepal Mini grid related solar/mini and micro hydro generated 578kW of electricity out of targeted 800kW.



Figure 10: Barekot Solar Mini Grid Project (170 kWp)



Figure 11: Solar Wind Hybrid System, Mityal, Palpa



Figure 12: Solar Irrigation Pump

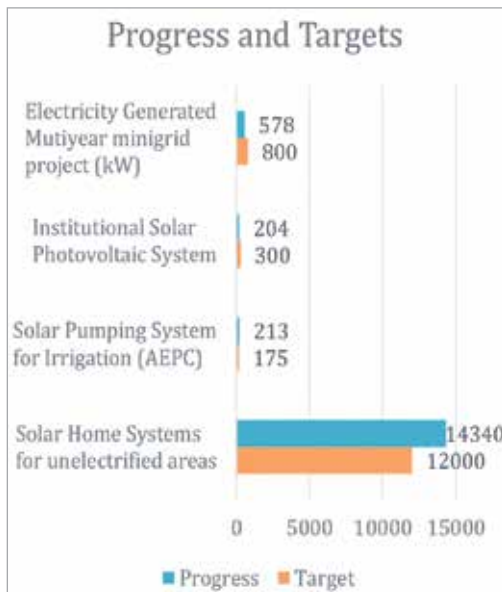


Figure 13: Progress of different activities under solar technology promotion

4.2.3 Bioenergy

Under NRREP, access to clean energy with Household Biogas Installation achieved 98% progress with 9,791 installations out of 10,000 targeted. In terms of the community and institutional biogas plant installation, 2 plants were completed out of the targeted 30 plants during the reporting period.

Clean energy program replacement of dung cakes and agricultural residue had targeted 16,000 installations out of which 10,430 installations were successfully completed. Similarly, out of targets of 5000 installations for Tier 3 improved cookstoves and rocket stoves installation at institutional and household level, 3348 successful installations were carried out.



Figure 14: Progress of biogas technology



Figure 15: Domestic Biogas Plant installation

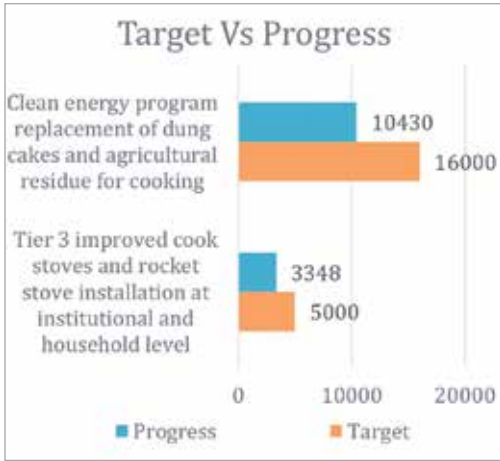


Figure 16: Progress of improved cook stoves



Figure 17: Electric cook stoves

4.2.4 Energy Efficiency

In the reporting period 2022/23, 5 energy efficiency support activities to public and private institutions were targeted for which 9 activities were successfully carried out.

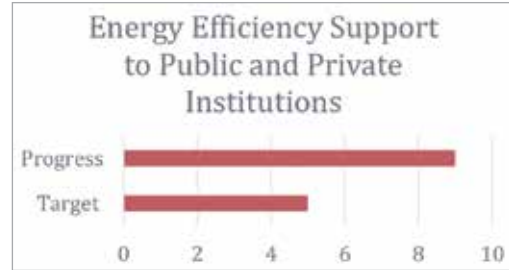
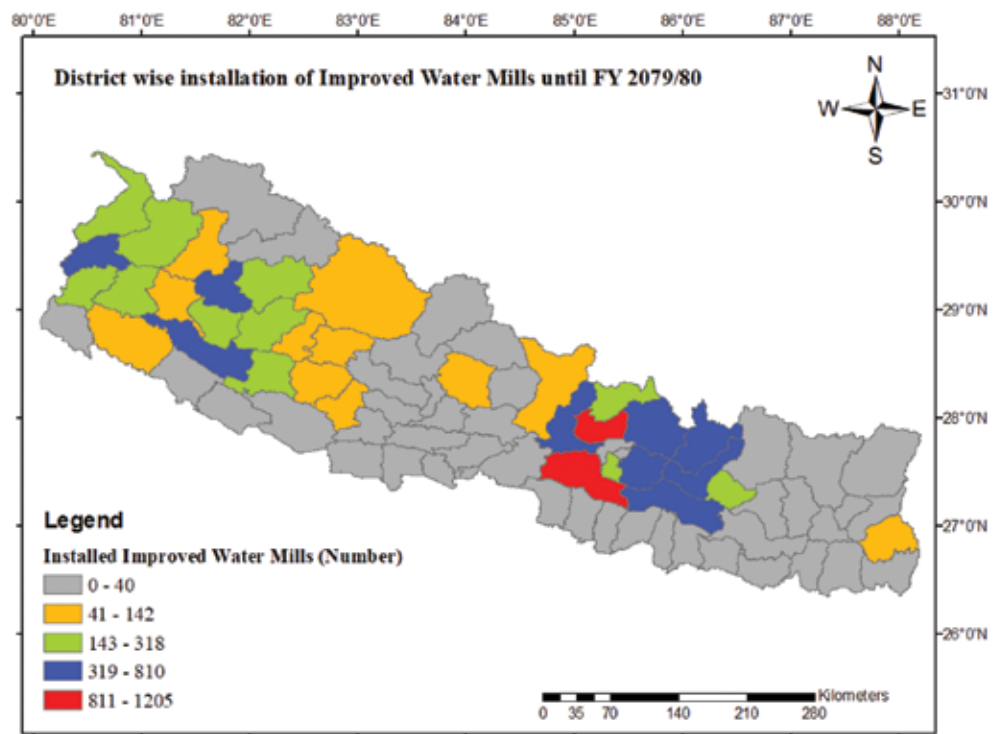
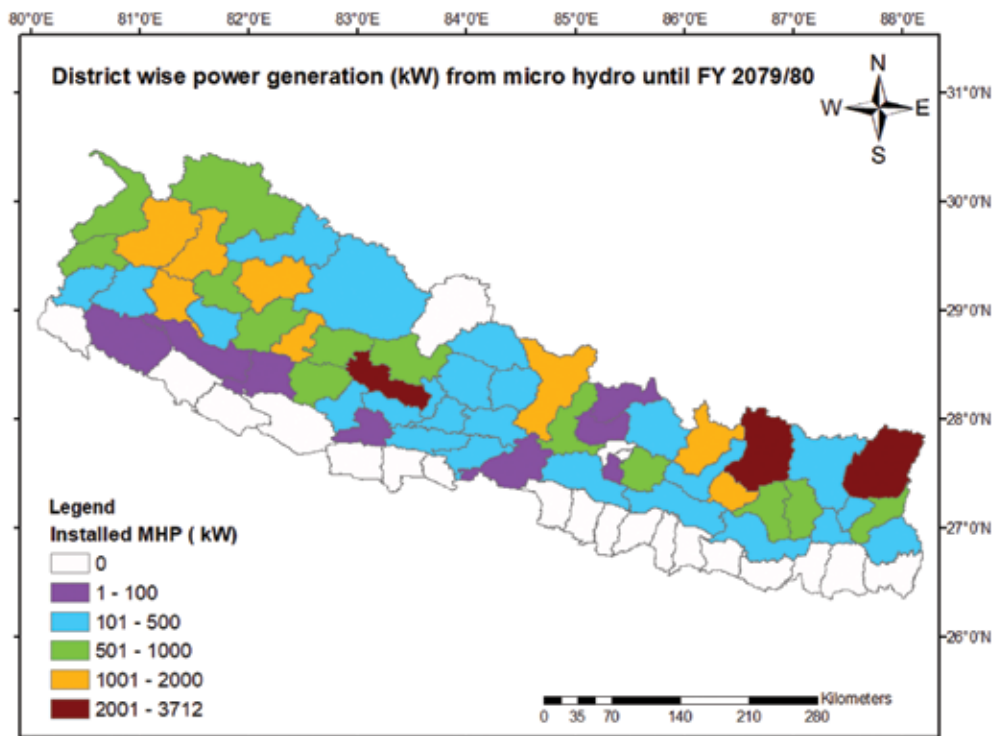
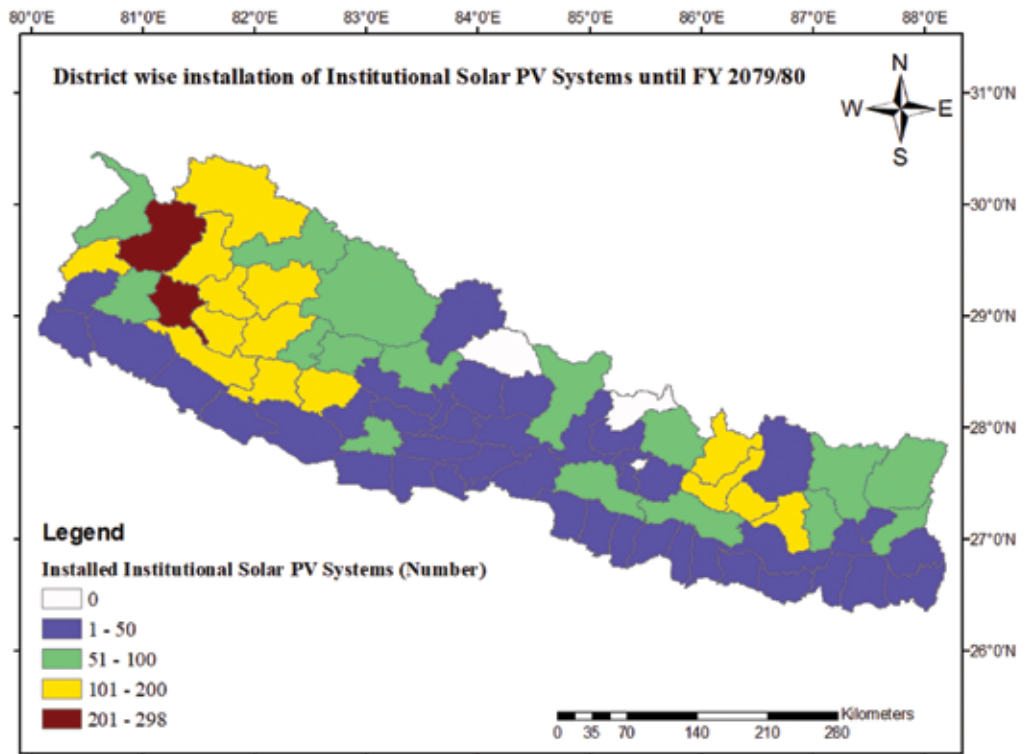
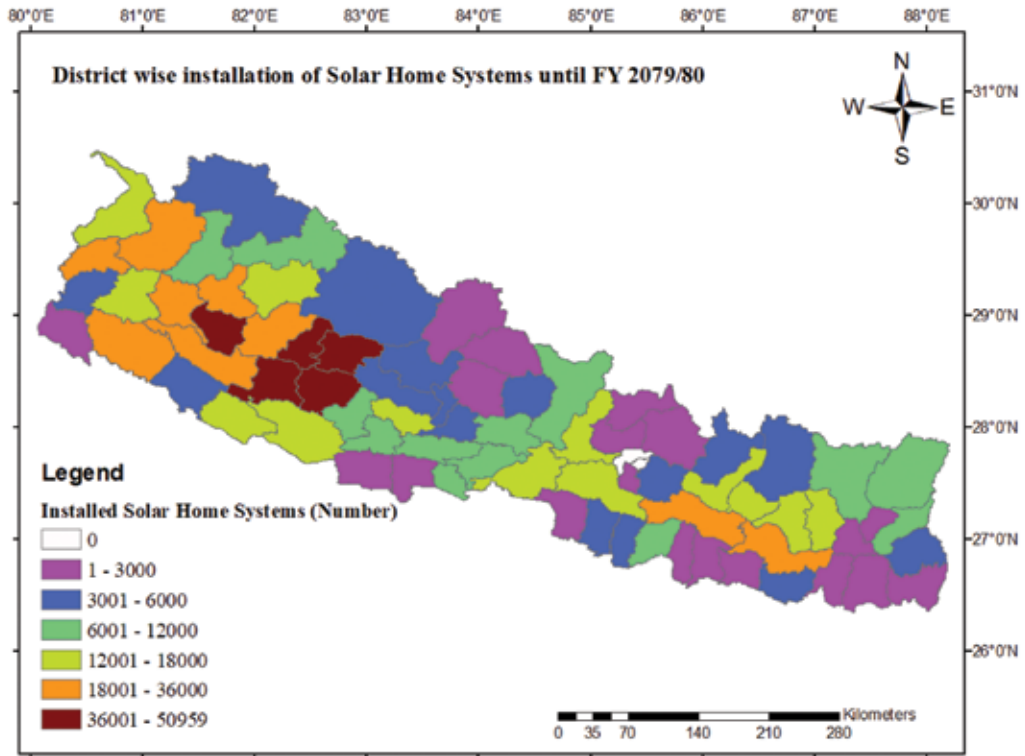
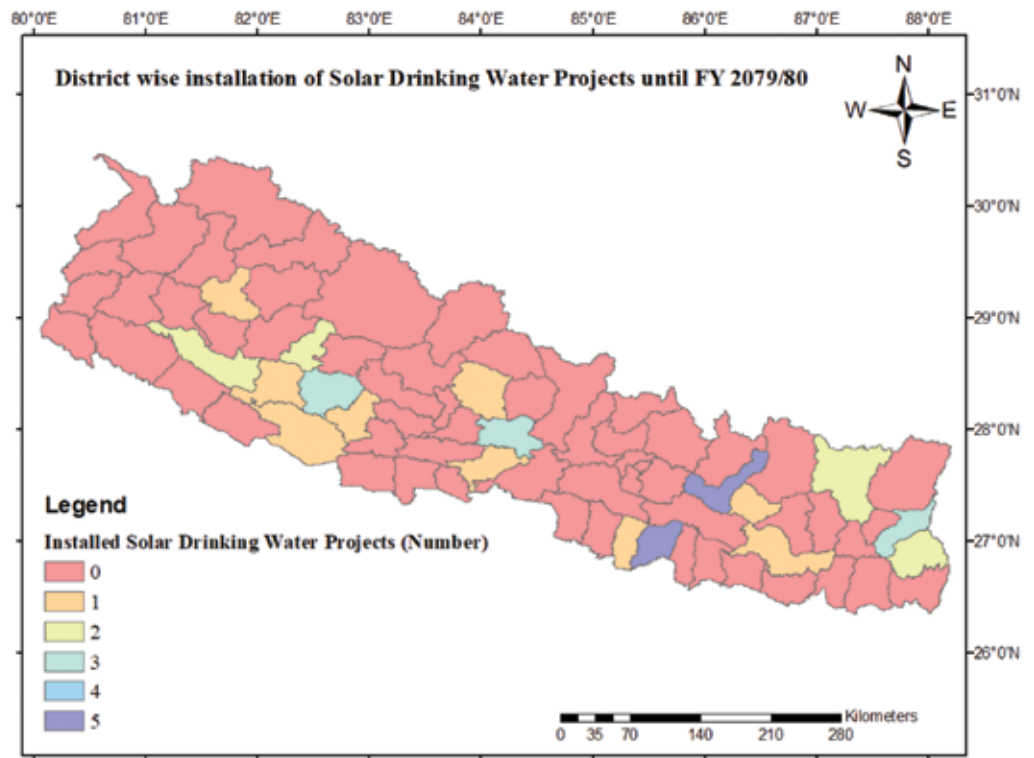
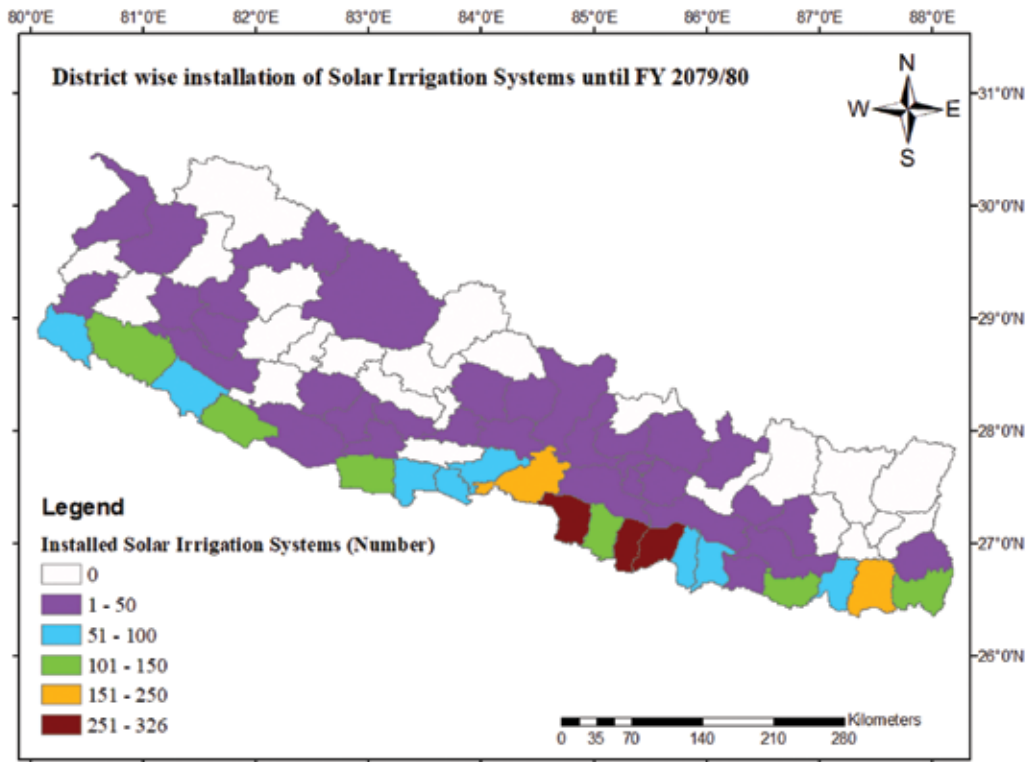


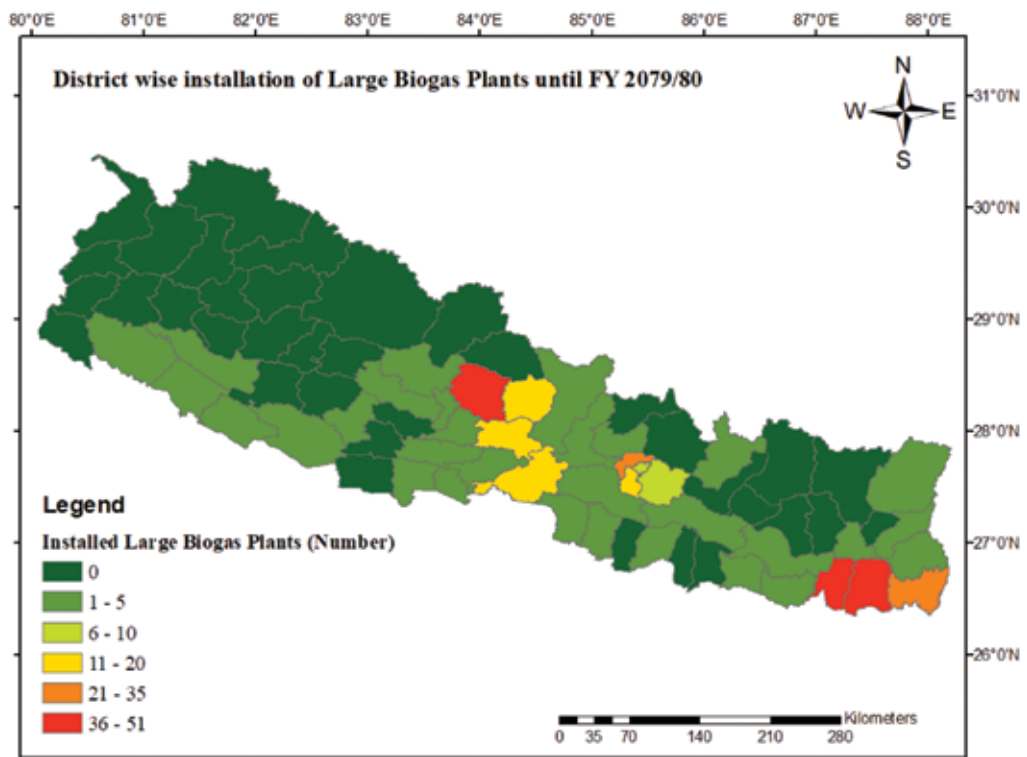
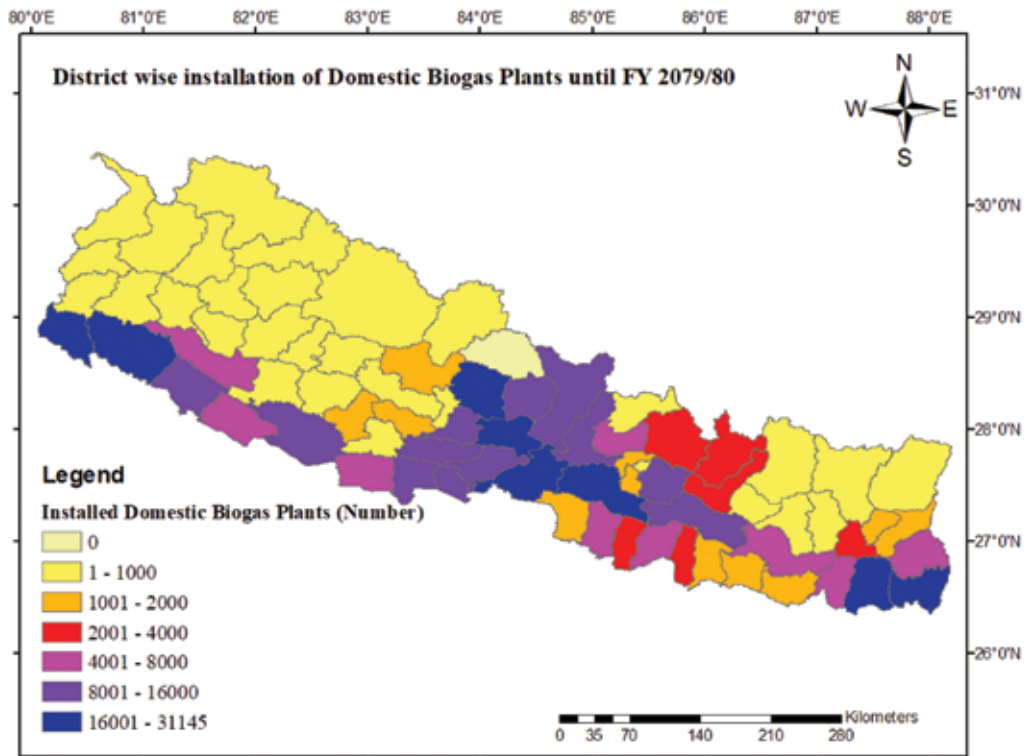
Figure 18: Progress of Energy Efficiency

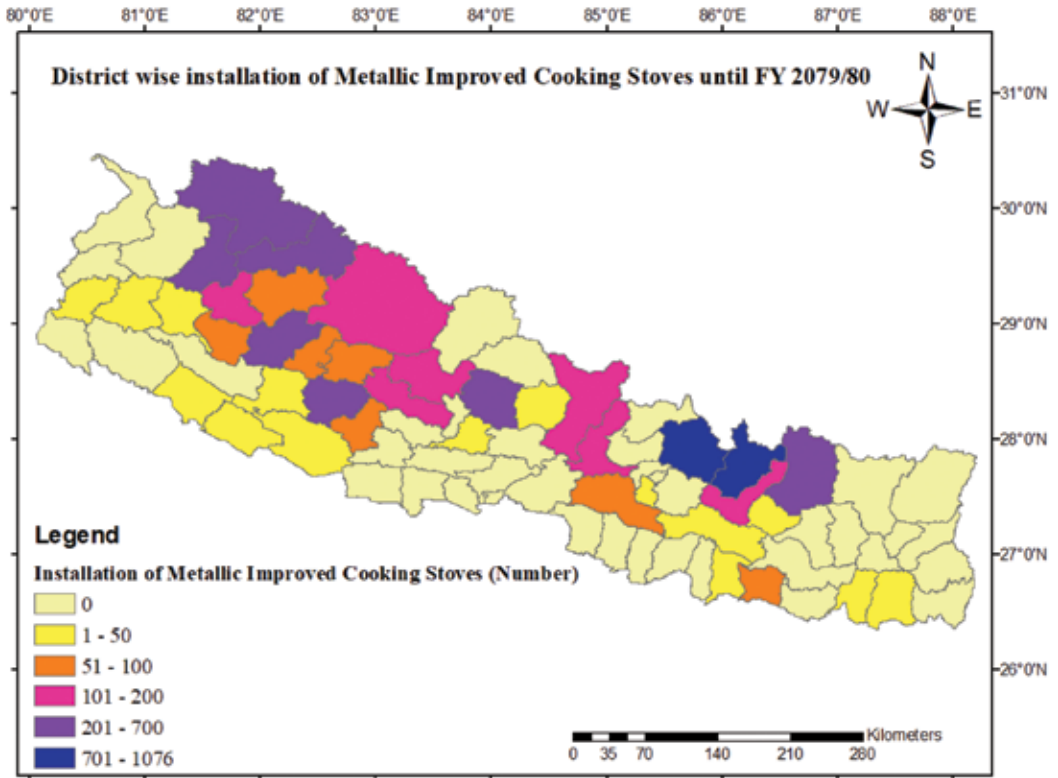
4.3 GIS MAPS RENEWABLE ENERGY TECHNOLOGIES













Capacity Building workshop under GCF Readiness Preparatory and Support Programme implemented by AEPC.

PROGRESS OF CROSS CUTTING ACTIVITIES

5.1 CARBON FINANCING ACTIVITIES

AEPC plays a prominent role in Nepal's endeavors concerning climate change. 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) due to a decision made by 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 Ministry of Finance's invitation for expressions of interest, the National Designated Authority (NDA) for Nepal, AEPC, submitted its application for national endorsement to attain the status of a Direct Access Entity (DAE) with the Green Climate Fund (GCF). During the 22nd GCF Board meeting, which took place from February 26th to 28th, 2019, AEPC's accreditation was successfully granted. This accreditation now enables AEPC to directly engage in projects with low to moderate environmental risks, supported by the GCF, with a total value of USD 50 million.

The accreditation to the GCF has presented significant opportunities for both AEPC and the nation.

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

A significant milestone has been reached through AEPC's accreditation as the DAE by the Green Climate Fund. 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 Programme.

5.1.1 Carbon Projects

AEPC holds eight Clean Development Mechanism (CDM) projects and

program of activities (PoA) which contributes as its regular source of revenue. Till date, around 5.96 million units of Certified Emission Reduction (CER) has been generated; and around 5.94 million units of CERs have been sold and earning carbon revenue of around 32.4 Million USD from Household Biogas, Improved Water Mill projects and Micro-hydro projects.

In terms of issuance of the certified emission reductions (CERs), for this fiscal year, Improved Water Mill PoA verification from the DoE is ongoing that will generate about 11,394 CER as a provisional issuance CER. Similarly, for the Biogas PA projects, it has issued about 186,532 CER as provisional issuance in CDM registry and for Biogas PoA: 569,523 CER has been issued as a provision issuance CER. In the gold standard registry, the performance review of Biogas PA is completed whereas the performance review of Biogas PoA is at the second round review stage. From the Gold Standard, the Biogas PA will generate 186,532 GS VER and 569,523 GS VER from Biogas PoA.

Development of Large Size Biogas as Carbon Programme in Nepal is proposed for ITMO under article 6.2 of Paris Agreement. Programme of Mitigation Activities Design Document (PoMA DD) and Component of Mitigation Activities Design Document (CoMA DD) is prepared for the article 6.2 of Paris Agreement and is submitted for the review in Ministry of Forests and Environment (MoFE). Similarly, AEPC have initiated the request for transition from CDM to Article 6.4 mechanism through

Ministry of Energy Water Resource and Irrigation (MoEWRI) to Ministry of Forests and Environment (MoFE).

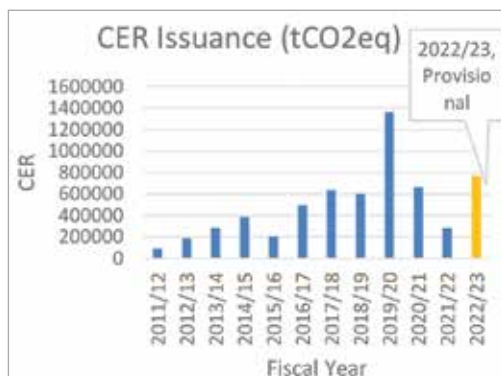


Figure 19: Year wise issuance of CERs (in '000)



Figure 20: Year wise carbon revenue earning (in M USD)

5.1.2 CDM Audits

Verification 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). Whereas the field verification of the Improved Water Mills PoA is not completed yet. 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 final validation reports are not uploaded in the CDM registry due to interim period for the transition from CDM to Paris agreement.

5.2 GENDER AND SOCIAL INCLUSION

Gender Equality and Social Inclusion (GESI) activities are integrated into all technologies and are spearheaded by the Gender Equality and Social Inclusion Section. Various initiatives have been carried out in the realm of GESI, with a focus on boosting the utilization of renewable energy 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

Environmental and social safeguard 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. 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.

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 convened a total of seven times during the reporting period. During this period, an audit of CREF was conducted, procedures for addressing sexual exploitation, abuse, and harassment were being developed, an internal control committee was established, and compliance reports were prepared at various intervals.

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 through the subsidy delivery mechanism. The MQA unit organized training for power output and household verification inspectors, as well as an orientation training program for third-party monitoring consultants.

5.6 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

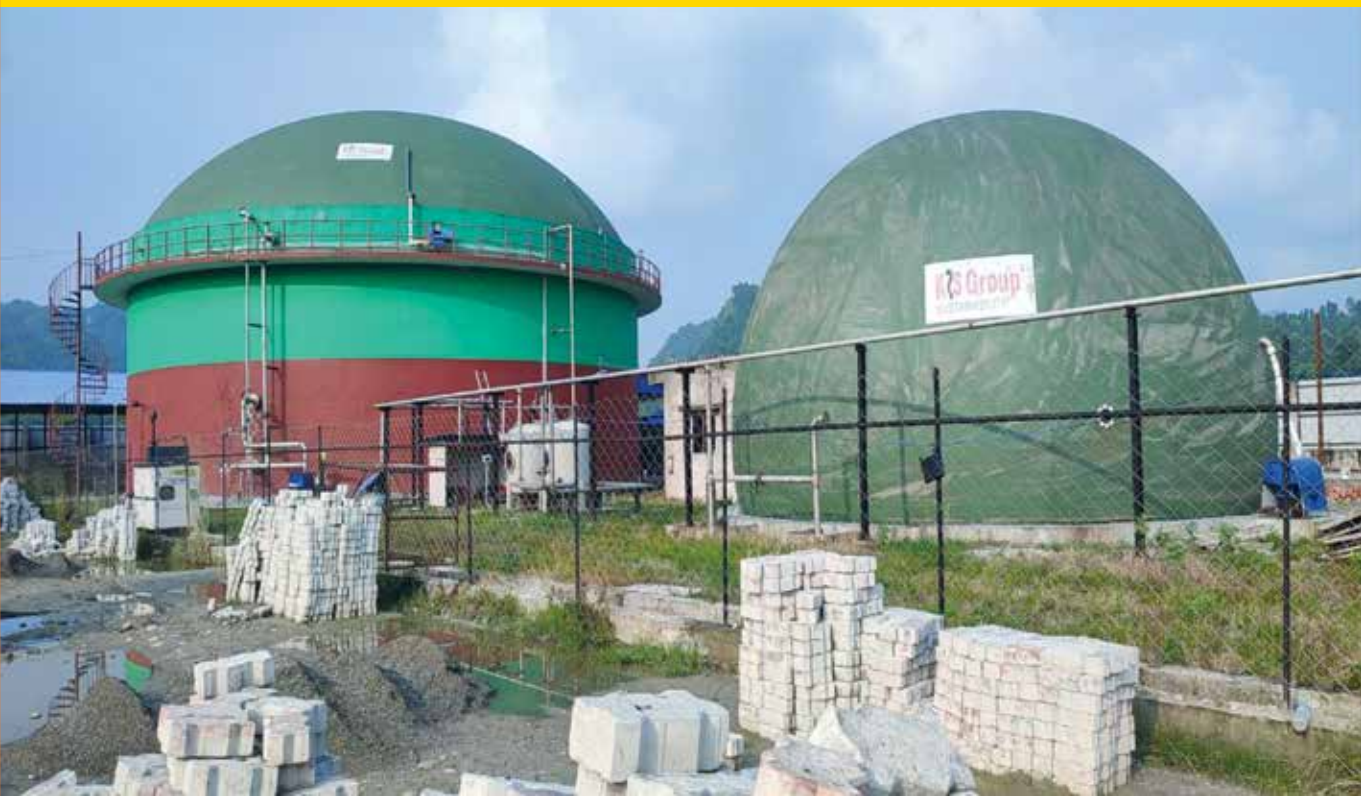
and provincial service delivery entities, private sector actors, other pertinent programs and projects, organizations, and relevant stakeholders. This entails working together and aligning efforts to strategically support the extension of RE accessibility to the intended beneficiaries through local and 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.

5.7 TRAINING AND CAPACITY BUILDING

AEPC continued with the capacity development activities of its partner organizations and other sectorial actors during the reporting period. In the reporting period trainings were conducted various RE and EE technologies, climate finance, technical support to provincial and local level, among others.





Municipal Waste to Energy Project, Damak Municipality, Jhapa

RENEWABLE ENERGY RESULT AREAS

6.1 ACCESS TO CLEAN ENERGY

The promotion of renewable energy in Nepal has played a crucial role in delivering clean energy access to those in need. To date, approximately 55 MW of electricity has been generated from Mini/Micro-hydro and Solar energy initiatives supported by AEPC, offering clean electricity solutions to 3.6 million households. This has reached 18% of the entire population and has generated 30,000 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.

ICS and biogas continue to be the primary technologies that offer clean cooking energy to households. In the reporting period, over a certain number of households experienced the advantages of having access to clean cooking energy provided by these technologies.

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 installation of IWM during the reporting period is anticipated to deliver effective milling services to rural households.

6.2 SUSTAINABLE DEVELOPMENT BENEFIT

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

Environmental Benefits: Efficiently utilizing locally available renewable energy resources for power generation aims to substitute carbon-intensive fossil fuels 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 indoor 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: Renewable energy 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 renewable energy technologies, such as large biogas and wind power, introduce new technological options for users to become acquainted with. From a wider standpoint, this presents the local market with the chance to improve their understanding of 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 21: Key RE related Sustainable Development Goals

6.3 GREEN-HOUSE GAS EMISSION REDUCTION

During the reporting period, the technology implemented by it helped in reducing the significant amount of Green House Gas Emission reduction. The estimated amount of emission reduction achieved by the technology implemented in the reporting period is 39,727 tCO₂eq. The detail technology wise emission reduction achieved is given in figure 24. The amount of emission reduction given above are the estimated amount of emission reduction and does not resemble to the tradable CERs.

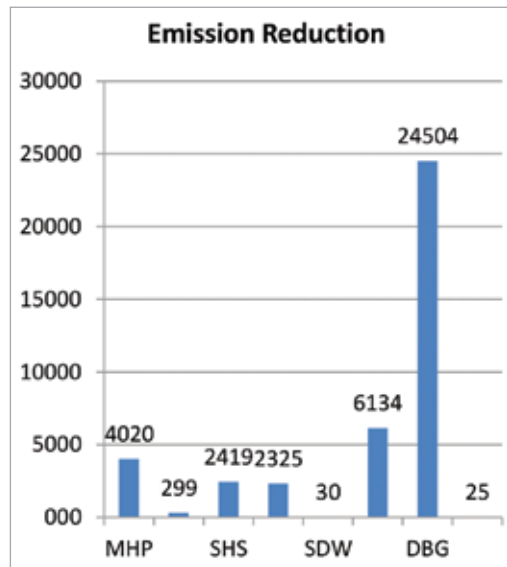


Figure 22: Emission Reduction Achieved by RETs installed during reporting period

6.4 SUCCESSFUL CASE STUDIES

Kankai Birta Arjun Waste to Energy Plant in Surunga, Jhapa:



AEPC with the support from World Bank has commissioned a 40 tons per day waste processing plant in Jhapa. The area of project implementation is in Sokedangi, Ward No. 2, Kankai Municipality, Jhapa district. The plant was being developed under the ownership of three municipalities i.e. Kankai Municipality, Birtamode Municipality and Arjundhara municipality with an objective to generate and sell biogas and organic fertilizers from organic waste. Various biodegradable substrates such as poultry litter, cattle manure, vegetable waste from nearby vegetable markets, and the organic fraction of municipal solid waste is being used to produce Bio-CNG and organic fertilizers. Approximately, 1350 kg Bio-CNG and 10 MT of fertilizer is being produced every day. The available land area allocated for the project is 3 bigah (20317.89 m²).



The project started its construction following the approval from Alternative Energy Promotion Center (AEPC) and Scaling up Renewable Energy Program (SREP). The digester of the plant is a continuous stirred tank reactor (CSTR) for biogas generation. The biogas generated is stored in a double membrane storage tank and underwent a purification process for removing impurities in the biogas. The enriched biogas is being supplied to commercial hotels and industries in Jhapa district. The digested slurry is further processed to produce organic compost, which is being sold commercially as organic fertilizer throughout the country.

Giri Khola Mini Hydro Project : Developed under Community Private Partnership (CPP) Model

AEPC with support from ADB has been implementing 8 mini hydro projects under SASEC Project. Giri Khola Mini Hydro Project (200 kW, 1,800 HHs) located in Tatopani Rural Municipality of Jumla district is one of them. Giri Khola MHP (GKMHP) stands out to be one of successful endeavors of SASEC off grid component. Giri Khola MHP is the planned project to provide electricity facilities to rural households and local enterprises of Tatopani Rural Municipality which is one of the Local Government of Jumla District and the surplus electricity distributed to the Jumla Bazar-the district headquarter where electricity through National Grid has been expended recently from Manma, Kalikot District under 11 KVA feeder line. 150 km long 33kV line with 'dog' conductors has been extended from Kohalpur, Banke to Manma, Kalikot through Surkhet and Dailekh. According to Jumla DCS, the average availability of gridline is less than 50% with very poor voltage profile.

The project has been completed on December 2021 and formally completed power output testing on July 2022 and provided electricity for 1,800 households. The project has envisioned for strong management team with experience and dedicated staff. One year operation and maintenance experience



team has been managed under the contract management from Contractor MS Gaura Construction and Hydro Energy Concern Pvt. Ltd. JV whom will provide on the job training for the dedicated staff recruited by the company for handover the plant after their contract obligation period. However, given the complexities of the power systems, operators from contractor cannot operate the plant properly and could result in frequent breakdowns unless their capacity is increased and backup support for systematic technical management, identification, and timely implementation of preventive and corrective measures. To achieve these capacities, the plant operators and developers need to be supervised and trained and closely supervised by experts with experience in operation and management of mini hydropower projects. AEPC has made provision for service of a team of experts to operate and manage the plant and train operators for a period of one year simultaneously and provide technical services for a number of years until the local technicians are capable of carrying out preventive maintenance and troubleshoot required corrective maintenance measures for uninterrupted operation.

Saplahkholā Rural Solar Drinking Water Project (RSDWP), Belakā Municipality 8, Udayapur, Province no 1, Nepal

In a groundbreaking partnership, the Alternative Energy Promotion Centre (AEPC) in Nepal, supported by KFW, has initiated the comprehensive program 'Promotion of Renewable Energy and Energy Efficiency in Nepal Phase 1.' This innovative endeavor has ushered in a wave of transformative change across the nation, focusing on strategic sectors that enhance the lives of communities and promote sustainable development.



With the help of KFW, AEPC successfully installed 90 Rural Solar Drinking Water Projects spanning various provinces, collectively boasting a capacity of 511.88 kWp. Moreover, in addition to these Rural Solar Drinking Water Projects (RSDWP), the initiative has also successfully implemented several large-scale RSDWP. One of the large-scale RSDWP is Saplahkholā Rural Solar Drinking Water Project (RSDWP) with Solar PV capacity of 39.06 kWp. Situated in Sunuwar Tole of Belakā Municipality, ward number 8 of Udayapur District, Nepal. This project stands as a testament to innovation and impact.

The primary objective of the Saplahkholā RSDWP is to provide clean drinking water to 88 households in Sunuwar Tole of Belakā Municipality, an area previously devoid of access to clean water. Leveraging a 39.06 kWp Solar PV array, the project efficiently lifts water from a vertical height of 530 meters, addressing the critical water needs of the community. Beyond the immediate provision of drinking water, this initiative plays a pivotal role in uplifting the living standards of the beneficiaries. It not only quenches their thirst but also empowers them, catalyzing positive change in their lives. The Saplahkholā Rural Solar Drinking Water Project serves as a model for sustainable development, showcasing the potential of renewable energy to enhance livelihoods and promote social well-being. Through meticulous planning, innovative technology, and a commitment to community welfare, this project exemplifies the transformative power of collaborative efforts between organization like AEPC and donor agency KFW.





Monitoring Visit of Sunkoshi Rural Solar Drinking Water Project at Sunpati Rural Municipality-4, Ramechhap

PROBLEMS, CHALLENGES AND LESSONS LEARNT

7.1 SECTORAL CHALLENGES

The Government of Nepal has been actively advocating for renewable energy since the mid-1970s. Over the years, it has periodically developed various policies, strategies, and guidelines to promote renewable energy within the country. 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 renewable energy initiatives across all three tiers of government. Local governments have assumed greater roles and responsibilities in the comprehensive planning and implementation of renewable energy. Nevertheless, these local and provincial governments face limitations in terms of technical and managerial capacities needed for effective promotion of renewable energy.

The sustainability of off-grid renewable energy systems is a significant issue for the sector. After the installation, rural communities often struggle to maintain and operate these renewable energy 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 renewable energy sector, there is a need to expand the adoption of renewable energy technology, effectively promote end-use applications, and connect the electricity generated by renewable energy systems to the 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 renewable energy 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 71% of the population still depends on traditional energy sources for cooking, presenting a substantial sector-wide challenge.

7.2 INHERENT PROBLEMS AND CHALLENGES OF AEPC

AEPC was initially established through a formation order, and to provide it with a more solid foundation and strengthen the renewable energy agenda, it is essential for AEPC to be established under a dedicated Act. This objective has been a top priority for AEPC for quite some time. Following a change in the ministry overseeing AEPC to the Ministry of Energy, Water Resources, and Irrigation (MoEWRI), the ministry formed a committee to draft the Renewable Energy and Energy Efficiency bill. This committee engaged in numerous discussions with stakeholders and submitted a draft bill to the Ministry.

- ❖ Implementing operational procedures in collaboration with local and provincial governments.
- ❖ Allocating revenue from carbon-related activities for investments in the renewable energy sector.
- ❖ 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.
- ❖ Coordinating and aligning support from development partners within the National Renewable Energy Framework.
- ❖ Expanding activities related to energy efficiency.
- ❖ Upholding quality standards for Renewable Energy Technologies (RETs) and adopting innovative technologies.

- ❖ Complying with new policies and regulations to enhance system improvements.
- ❖ Activating the Renewable Energy Sector Management Information System (MIS) at the federal, provincial, and local levels.
- ❖ Strengthening capabilities and establishing facilities for an effective Battery Management System.
- ❖ Re-defining the role and functions of AEPC within the new federal context.
- ❖ Transitioning AEPC into a national and regional Center of Excellence.

7.3 LESSONS LEARNT IN THE REPORTING PERIOD

Based on experience on implementation of programs/projects, Followings are the key lesson learned:

- ❖ Electricity access has significant positive outcomes for rural livelihoods, potentially improving 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 isolated renewable energy systems. Hence, the promotion of renewable energy 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 rural energy solutions. To attract private sector involvement in the operation and management of renewable energy 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 implementation of electronic tools like the Subsidy Administration Management System (SAMS) for subsidy administration has been successful. This has enabled AEPC to transition to a paperless processing system for subsidy application forms related to household-based technologies. This success has the potential for replication in community and institutional renewable energy systems. As a result, the Renewable Energy Management Information System (MIS) should be fully operational, encompassing provincial and local levels and eventually replacing all existing systems.

7.4 OPPORTUNITIES AND WAY FORWARD

Despite the challenges, opportunities are present, and it is essential to capitalize on these available opportunities. Opportunities for the implementation of renewable energy technologies exist, but the sector has not been successful in attracting an adequate amount of financial resources. AEPC is cognizant of the opportunities for renewable energy financing through climate-related avenues and has initiated efforts to maximize its potential.

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

- ❖ Global concerns about climate change and its consequences create opportunities for the deployment of renewable energy.
- ❖ National commitments to Sustainable Development Goals (SDGs), Sustainable Energy for All, and Nationally Determined Contributions (NDC) targets necessitate collective efforts to promote renewables, 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 the Green Climate Fund (GCF), Climate Investment Fund (CIF), and Mitigation Action Facility

can facilitate the attraction of national private sector investments, as participation in such funds can serve as a risk guarantee for private investments.

- ❖ Capitalizing on synergies with the Nepal Electricity Authority (NEA) and other institutions for large-scale grid integration of Renewable Energy Technologies (RETs).
- ❖ The new mandate given for Energy Efficiency opens up new possibilities for AEPC.
- ❖ The current demand for Large-Scale Biogas Plants and Waste-to-Energy Projects presents an area where AEPC's experience can offer substantial advantages.
- ❖ Utility-Scale Grid-Connected Solar Systems have significant potential for reducing the persistent reliance on imported energy.

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.

- ❖ Forge strong connections with provincial and local government levels to support renewable energy initiatives. AEPC aims to support overall renewable energy development as the "Centre of Excellence" within the changed context.
- ❖ Initiate discussions with the government to clarify the transition of responsibility for promoting renewable energy technology to local governments, as mandated by the constitution. AEPC can aid

the government in establishing renewable energy service infrastructure at the local government level.

- ❖ Enhance the Compliance Unit by increasing its resources and prioritizing compliance-related findings.
- ❖ Streamline new mandates and responsibilities, including energy efficiency, working procedures with local and provincial governments, utility-scale solar PV, and the grid integration of Mini/Micro-Hydro Projects.
- ❖ Secure international climate finance by promptly developing project concepts and pipelines, and assemble a skilled team to prepare bankable proposals for climate financing.
- ❖ Implement new financial mechanisms like smart subsidies, challenge funds, and result-based financing to prepare the private sector to attract more investments in renewables.
- ❖ 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.
- ❖ Establish an 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.

- ❖ Align the support from Development Partners (DPs) with the National Renewable Energy Framework.
- ❖ 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.
- ❖ Implement the challenge fund to ensure inclusive and broad participation and stimulate innovation.
- ❖ 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.



ANNEXES

Annex-1: Progress achieved in 2022/23 for the programs/activities (AEPC Core Activities)

SN	Activity/Program	Unit	2022/23		
			Target	Achievement	% Achievement
1	Improvement and Reconstruction of Clean Development Mechanism (CDM) Registered Micro Mini Hydro and Improved Water Mill	No.	12	5	42%
2	Detail Feasibility Study of Solar Mini Grid Projects	No.	20	18	90%
3	Detail Feasibility Study of Pico, Micro Mini Hydro	No.	30	4	13%
4	Implementation of energy efficiency program at federal, provincial and local level	No.	7	1	14%
5	Technical standards of five electrical appliances. Preparation of baseline and benchmark	No.	2	1	50%
6	Solar pump for irrigation	No.	160	211	132%
7	Electricity generation from mini grid project (Multiyear program)	KW.	800	578	72%
8	Solar Home System installation in community and religious places	No.	100	100	100%
9	Integration of micro/mini hydro projects in national grid	No.	2	1	50%
10	Incomplete and sick micro hydro completed and rehabilitation	No.	11	10	91%
11	Detail Feasibility Study of micro mini hydro projects for integration in national grid	No.	1	6	600%
12	Clean energy program: replacement of dung cakes and agricultural residue for cooking	No.	16000	10430	65%
13	Support in energy efficiency to public and private institution	No.	5	9	180%

Annex-2: Progress achieved in 2022/23 for the programs/activities (NRREP)

SN	Activity/Program	Unit	2022/23		
			Target	Achievement	% Achievement
1	Community and Institutional Biogas Plant	No.	30	2	7%
2	Installation Access to clean energy with Household Biogas Installation	No	10000	9791	98%
3	World Bank supported Nepal Mini grid related W2E, solar/mini and micro hydro development grant and loan	Kw.	1700	2	0%
4	Electrification through mini hydro installation (including SASEC project)	Kw.	1500	1108	74%
5	Solar home system for un-electrified areas	No	12000	14340	120%
6	Solar water Pumping for Irrigation and Drinking water	No.	15	2	13%
7	Institutional Solar Photovoltaic System for various institutions	No.	300	204	68%
8	Solar cooker and dryer installation	No.	100	0	0%
9	Clean Cooking Solutions Project Implementation Under GCF	No.	10	2	20%
10	Tier 3 improved cook stoves and rocket stove installation at institutional and household level.	No.	5000	3348	67%
11	Carbon and climate change related activities	No.	10	10	100%
12	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on community electrification	No.	10	8	80%
13	Nepal Mini-grid related activities	No.	20	17	85%
14	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on solar	No.	15	8	53%
15	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on bio energy	No.	10	7	70%
16	Third party monitoring of Household based RETS Power output verification and testing of micro/mini hydro projects	No.	6	5	83%
17	Environment and social safeguard	No.	5	2	40%
18	GESI related activities	No.	6	2	33%
19	DKTI related activities (solar energy promotion in rural and semi-urban areas)	No.	35	28	80%
20	Sustainable Energy Challenge Fund for promotion of RETs	No.	5	11	220%
21	Management of subsidy application form processing	No.	10	10	100%
22	NRREP Management Expenditure	No.	20	20	100%
23	Compliance related activities	No.	5	1	20%

Annex-3: District wise installed RETs 2079/80

District	IWM	MHP	SHS	LBG	DBG	MICS	ISPS	Solar DWS	Solar Irrigation
Achham	0	50.5	893				28		
Arghakhanchi	0		4		7				2
Baglung	0	66				12	4		
Baitadi	0		543				19		
Bajhang	0		375				20		
Bajura	0		298			329	9		
Banke	0		197		115	2			2
Bara	0		69		344				9
Bardiya	0		2		235	2			12
Bhaktapur	0				3				
Bhojpur	0		5		11		6		
Chitwan	0		113		80		1		17
Dadeldhura	0		232		5	19	5		
Dailekh	0	30	772		12	3	6		
Dang	0		191		267	13	3		5
Darchula	0	100	162		3		1		
Dhading	0		255		195	19			
Dhankuta	0				71				
Dhanusa	0				76	44			
Dolakha	0		31		87	438	1		3
Dolpa	0		1,056				3		
Doti	0		33				2		
Gorkha	0		17		219	188			
Gulmi	0		10		3				1
Humla	0	64	516			217	3		
Ilam	0				218				
Jajarkot	0		1,795		1	13	17		
Jhapa	0				465		1		13
Jumla	0	41	229			46	11		
Kavrepalanchowk	0		38		283				
Kailali	0		226		233		1		7
Kalikot	0		975			102	13		

District	IWM	MHP	SHS	LBG	DBG	MICS	ISPS	Solar DWS	Solar Irrigation
Kanchanpur	0				190				6
Kapilvastu	0				134				2
Kaski	0				309	291			
kathmandu	0				13				
Khotang	0		69		14		5		
Lalitpur	0				36	23			
Lamjung	0		5		874	30			
Mahottari	0				75				2
Makwanpur	0		175		1620	48	1		6
Manang	0								
Morang	0			1	741	1			22
Mugu	0		179			92			
Mustang	0						1		
Myagdi	0		8		1	66	5		
Nawalparasi East	0		104		4		1		
Nawalparasi west	0				21				
Nuwakot	0				159				
Okhaldhunga	0		54		1	7	1		
Palpa	0		162		157		1		
Panchthar	0		9		27				
Parbat	0				2				
Parsa	0				111				30
Pyuthan	0		29		14	67			
Ramechhap	0		12		21	38		1	
Rashuwa	0				108				
Rautahat	0		1		126				1
Rolpa	0		694		39	88	4		
Rukum East	0				0	7			
Rukum West	0		602		7		5		
Rupandehi	0				30				25
Salyan	0		1,036		62	12			
Sankhuwasabha	0		14		55			1	
Saptari	0				57				1
Sarlahi	0		1		321				24

District	IWM	MHP	SHS	LBG	DBG	MICS	ISPS	Solar DWS	Solar Irrigation
Sindhuli	0		845		252	1	7		8
Sindhupalchowk	0				86	529	1		
Siraha	0				62	64			3
Solukhumbu	0	200				296	1		
Sunsari	0			1	127	3			1
Surkhet	0		1,121		243		13		3
Syangja	0				110	2			
Tanahun	0		76		1011		1		
Taplejung	0	552			113		2		
Terhathum	0				76		1		
Udayapur	0		107		212				6





Nepal Delegation to 3rd Asian and Pacific Energy Forum on "Building a secure, sustainable and interconnected energy future for Asia and the Pacific"



Inauguration of RSDWP at Belaka Municipality,-8, Udayapur



Executive Exchange on Energy Efficiency: Visit to University of Flensburg, Germany



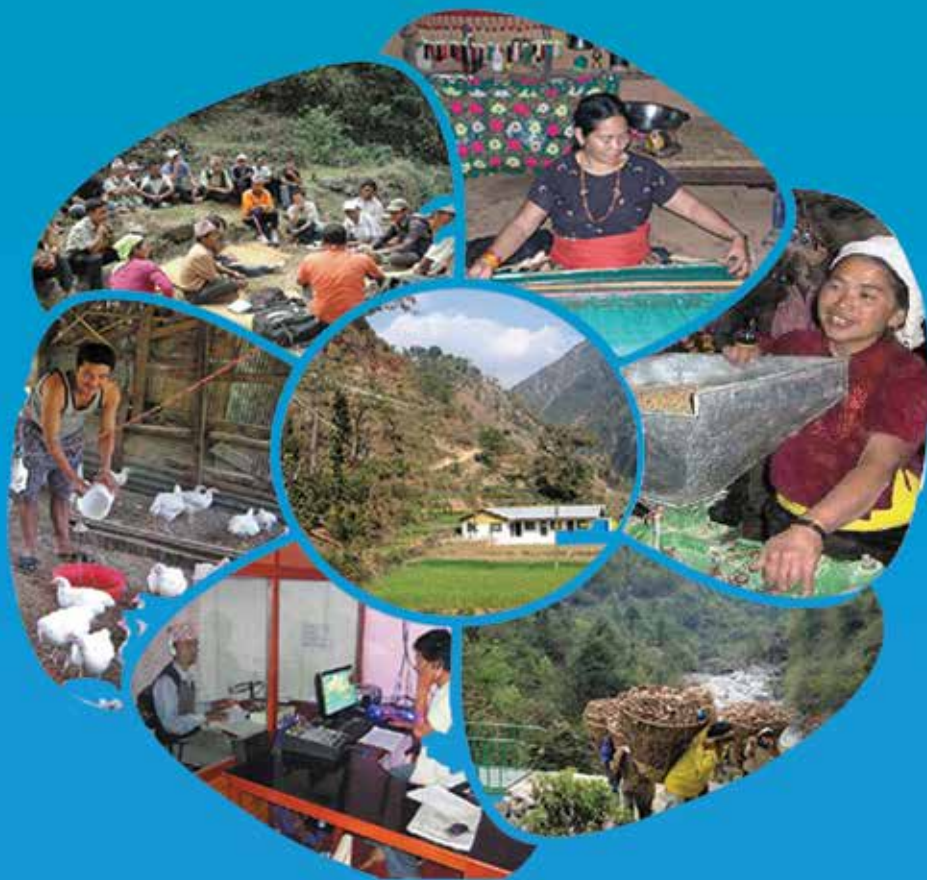
Farewell of immediate past Executive Director of AEPC, Dr. Madhusudhan Adhikari



KFW mission visit for DKTI Project



MoU Between AEPC and Renewable Energy Confederation, Nepal (RECON)



Government of Nepal
Ministry of Energy, Water Resources and Irrigation
Alternative Energy Promotion Centre
Mid Baneshwor, Kathmandu, Nepal, Tel : +977-1-4598013
Email: info@aepc.gov.np, **Web :** www.aepc.gov.np