ALTERNATIVE ENERGY PROMOTION CENTRE

THREE DECADES OF SERVICES

Beyond Numbers

30 — YEARS












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

November 2026

Alternative Energy Promotion Centre

Three Decades of Services; Beyond Numbers

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Message from the Rt. Hon. Prime Minister



Prime Minister

Kathmandu, Nepal

MESSAGE

I extend my heartfelt congratulations to the Alternative Energy Promotion Centre (AEPC) on its 30th anniversary. Since November 1996, AEPC has been a cornerstone of Nepal's sustainable development, successfully expanding clean energy access to over 3.7 million households and transforming rural livelihoods, local economies, and public services.

Beyond deploying diverse renewable technologies-from decentralized solar and mini-grids to clean cooking and productive energy uses-AEPC has pioneered crucial advancements in climate finance and carbon markets as Nepal's first Direct Access Entity to the Green Climate Fund.

As we advance toward our national goals of energy security, climate resilience, and net-zero emissions by 2045, renewable energy remains vital. To institutionalize this momentum, we have tabled the Renewable Energy and Energy Efficiency Bill in Parliament, which will transform AEPC into a modernized center. The Government of Nepal remains fully committed to strengthen the legal and institutional frameworks required to accelerate this green transition.

On this milestone occasion, I commend the dedication of AEPC's leadership and staff, and express my sincere gratitude to our development partners, the private sector, civil society, and local communities for their invaluable collaboration over the past three decades. I look forward to our continued partnership in shaping a prosperous and sustainable future.

October, 2026

Balendra Shah

Message from the Hon. Minister

Ministry of Energy, Water Resources and Irrigation



Biraj Bhakta Shrestha
Minister
Ministry of Energy, Water Resources & Irrigation

Government of Nepal

Singhdurbar, Kathmandu, Nepal
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Ministry of Energy, Water Resources & Irrigation

Letter No.

Ref. No.

MESSAGE FROM THE HONOURABLE MINISTER

It is my immense pleasure to extend my warmest greetings to the Alternative Energy Promotion Centre (AEPC) on the auspicious occasion of its 30th Anniversary. Three decades of institutional service mark a significant milestone in Nepal's journey towards universal access to modern energy, sustainable development and climate resilience. Since its establishment in 1996, AEPC has evolved into a key institution of the Government of Nepal for promoting renewable energy and energy efficiency. Through decentralized renewable energy systems, AEPC has made remarkable contributions to improving livelihoods and expanding energy access, particularly in remote and underserved communities. I am pleased to note that AEPC-supported technologies have benefited more than 3.7 million households, reflecting inclusive and sustainable development.

As Nepal aspires to achieve a low-carbon, climate-resilient and prosperous future, renewable energy and energy efficiency will remain central to our national development priorities and international commitments, including the Sustainable Development Goals, Nationally Determined Contributions and the national target of achieving net-zero emissions by 2045. In this context, AEPC's role in promoting decentralized energy solutions, clean cooking, energy efficiency and productive energy use is increasingly important in ensuring universal energy access and advancing a just energy transition.

Recent climate-induced disasters have further underscored the importance of distributed renewable energy systems in strengthening national resilience. I particularly appreciate AEPC's prompt response following the devastating floods in the Bhotekoshi–Trishuli corridors on 26 August 2026, in coordination with the Ministry, Nepal Electricity Authority, local governments, the private sector and development partners, to restore essential energy services to affected households and public institutions. This experience demonstrates that renewable energy is not only an instrument of development but also a vital component of disaster preparedness and resilient recovery.

AEPC's accreditation as Nepal's first Direct Access Entity to the Green Climate Fund and its growing engagement in carbon markets and climate finance are other significant institutional achievements. Its efforts to access the Fund for Responding to Loss and Damage also reflect its commitment to mobilizing international resources for climate resilience and sustainable recovery. These initiatives need to be further strengthened to support transformative investments in resilient energy infrastructure.

Looking ahead, the Government remains committed to creating a stronger policy, legislative and institutional environment for Nepal's clean and resilient energy future and expanding the cooperation at the regional and global level. The Renewable Energy and Energy Efficiency Bill, currently under consideration in the House of Representatives, is an important step towards establishing a comprehensive legislative foundation for the sector. Similarly, the proposed transformation of AEPC into a strengthened Renewable Energy and Energy Efficiency Centre is expected to enhance its institutional capacity and enable it to respond more effectively to emerging national energy and climate priorities.

On this special occasion, I sincerely appreciate the invaluable contributions of development partners, provincial and local governments, the private sector, financial institutions, academia, civil society and communities in advancing Nepal's renewable energy sector. I also extend my heartfelt appreciation to the Executive Director, former and present officials, and the entire AEPC team for their dedication, professionalism and commitment to public service. I wish AEPC continued success in its mission and look forward to its greater contributions towards a sustainable, inclusive, resilient and energy-secure Nepal.

.....

Mr. Biraj Bhakta Shrestha
Hon'ble Minister, Ministry of Energy, Water Resources and Irrigation, and
Chairperson, Alternative Energy Development Board

Singhdurbar, Kathmandu, Nepal Phone: 977-1-4211513

Message from the Secretary

Ministry of Energy, Water Resources and Irrigation



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Ministry of Energy, Water Resources and Irrigation

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MESSAGE FROM THE SECRETARY

I take this opportunity to extend my warm greetings to AEPC on the auspicious occasion of its 30th Anniversary. Over the past three decades, AEPC has played a central role in advancing Nepal's renewable energy and energy efficiency agenda, and this milestone provides an opportunity to recognize the institutional commitment, assess the progress achieved and reaffirm the responsibility to deliver an inclusive, reliable and sustainable energy future. AEPC's particular focus to serve geographically remote communities, economically disadvantaged households, women and other underserved groups is commendable.

I am happy to oversee that AEPC has established a diversified portfolio of renewable energy interventions, demonstrating its contribution to Nepal's sustainable development. The key achievements in electricity generation are installation of more than one million solar home systems, 4,540 institutional solar photovoltaic systems, 41.35 MW of micro and mini hydropower, 47.74 MW of solar rooftop systems, and 4.08 MW of solar/solar–wind mini-grids. In clean cooking, the cumulative achievements include 4,59,345 household biogas plants, 1.42 million mud improved cookstoves, 2,05,601 metallic improved cookstoves and 1,49,960 electric induction cookstoves. Likewise, 4,597 solar water pumping systems for drinking water and irrigation, 11,104 improved water mills and 1,766 productive energy use enterprises have been supported. Collectively, AEPC's initiatives have reached more than 3.7 million households, with some households adopting multiple technologies and hence counted in multiple categories.

AEPC has also advanced financing approaches that broaden participation in the energy transition. The Sustainable Energy Challenge Fund, established under Central Renewable Energy Fund, has used viability gap funding to encourage private investment in renewable energy and energy efficiency. Climate finance and carbon markets constitute another important dimension of AEPC's work. It got accredited in 2019 as Nepal's first Direct Access Entity to the Green Climate Fund (GCF). The ongoing USD 49.2 million Clean Cooking Solutions project, including a USD 21.2 million GCF grant, demonstrates the significance of this capability. Cumulative carbon revenue of USD 49 million generated through carbon trade further illustrates the potential to translate emission reductions into resources for sustainable development.

As AEPC completes its three decades, priority must be given to equitable access, dependable services, productive energy use and demonstrable improvements in renewable energy and energy efficiency. Strong coordination among federal, provincial and local governments, together with accountable institutions and effective partnerships, will be essential to achieving the sectoral targets set by government under the Energy Development Roadmap, Sixteenth Plan and Nepal's Nationally Determined Contribution (NDC 3.0). In this backdrop, I trust that the Renewable Energy and Energy Efficiency Bill registered in the parliament, once approved as an act, will provide a strong legal basis for the advancement of renewable energy and energy efficiency in Nepal as well as AEPC's restructuring.

I congratulate AEPC for bringing together its achievements, institutional experience and community perspectives in this 30th anniversary publication. I extend my sincere appreciation to its leadership and staff, development partners, provincial and local governments, private sector, financial institutions, academia, civil society and community organizations for fruitful collaboration. Their continued commitment will be vital to build on this foundation and advancing Nepal's sustainable, inclusive and climate resilient energy development.

October 30, 2026

Dr. Jagadishwor Karmacharya
Secretary, Ministry of Energy, Water Resources and Irrigation, and
Member, Alternative Energy Development Board



Government of Nepal
Ministry of Energy, Water Resources and Irrigation
Alternative Energy Development Board
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EXECUTIVE DIRECTOR'S REPORT

Established on 3rd November 1996 (18 Kartik 2053 BS), the Alternative Energy Promotion Centre (AEPC) - under the purview of the Ministry of Energy, Water Resources and Irrigation (MoEWRI), Government of Nepal (GoN) - has been partnering with development partners (DPs), provincial and local governments, private sector, financial institutions, academia and civil society organizations to deliver renewable energy (RE) and energy efficiency (EE) solutions. As Nepal advances its national vision for a clean, resilient and green economy, AEPC remains at the forefront of driving RE and EE across the country.

The Constitution of Nepal, 2015 (Clause 30) guarantees every citizen the right to live in a clean and healthy environment as a fundamental right. The Constitution {Clause 51(g)(3)} further obliges the State to ensure a reliable supply of energy in an affordable and easy manner by generating and developing renewable energy and making appropriate use of energy to fulfil the basic needs of citizens Energy-related responsibilities are distributed among the federal, provincial and local levels (Clauses 57 & 58 and Schedules 5-9), emphasizing collaboration, coordination and cooperation among all tiers of government. Guided by these constitutional mandates, AEPC continues to align its roles and responsibilities with Nepal's federal structure and national commitment to clean and resilient energy system and inclusive socio-economic development.

Nepal is endowed with abundant renewable energy resources and is steadily transitioning towards a sustainable, low-carbon economy. Recognizing energy as a national priority, GoN has articulated its vision across key strategic documents, including the Rural Energy Policy, 2006; Sustainable Development Goals: Status and Roadmap, 2016–2030; Biomass Energy Strategy, 2017; National Energy Efficiency Strategy, 2018; Long Term Strategy for Net Zero Emissions by 2045; Green Hydrogen Policy, 2024; Sixteenth Plan, 2024/25–2028/29; Energy Development Roadmap and Action Plan, 2024; and Nationally Determined Contributions (NDC 3.0), 2025.

As AEPC proudly marks the thirty years of services to the Nepali people, it continues to deliver clean, affordable and modern energy solutions at household, institutional and enterprise levels, following the inclusive approach and being sensitive to the social justice. These efforts have significantly expanded the share of renewable energy in Nepal's energy mix, improved reliability and quality, reduced dependency on traditional and imported fossil fuels, and enhanced national energy security while contributing to improved livelihoods, local economic activities, employment creation, clean energy transition, emissions reduction and sustainable development. Through these interventions, AEPC has supported in accessing clean energy technologies and services from rural and semi-urban communities to commerce and industries in the cities working through more than 500 companies.

Over the past three decades, AEPC's interventions have reached a cumulative number of 3.7 million households with modern energy services. A total of 41 MW of mini and micro-hydropower and 74 MW of solar energy (from solar home systems, solar rooftop, solar mini-grids and institutional solar photovoltaic systems) have been generated, bringing sustainable electricity to households, communities and institutions. Likewise, 459,345 domestic biogas plants, 205,601 metallic improved cookstoves, 149,960 electric stoves and 380 institutional, urban and commercial biogas plants have been deployed, enabling clean and efficient cooking energy use. The Centre also supported the installation of 4,597 solar water pumping systems for drinking water and irrigation and while 11,104 improved water mills for agro-processing. Similarly, AEPC also supported the installation of 4,865 solar systems in religious places and homestays, 3,309 solar street lights, 33 institutional gasifiers, and 2,464 solar dryers and cookers in remote areas, and 1,769 small and medium enterprises for productive energy use.

AEPC's experience with carbon projects under the Clean Development Mechanism (CDM), Gold Standard (GS) and VERRA has laid a strong foundation for future carbon initiatives under both the Paris Agreement and voluntary carbon markets. Through its CDM and Gold Standard projects, the Centre has achieved

The National Agency Working for Renewable Energy and Energy Efficiency

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cumulative emission reductions of 6.79 million tons of CO_2 equivalent and generated carbon earnings of 49 million USD, of which 36.011 million USD has already been received to date and another 13 million USD has been secured. The Centre's CDM projects have already been transitioned into the Article 6.4 Mechanism. AEPC has registered the "Ecozone Improved Cooking Stoves Project in Nepal" in the VERRA Registry, with anticipated annual emission reductions of 44,044 tons of CO_2 equivalent. Building on this success, AEPC has begun developing large-scale biogas projects under the Paris Agreement's Article 6.2 Mechanism to facilitate Internationally Transferred Mitigation Outcomes (ITMOs). Notably, AEPC became the first Direct Access Entity to the Green Climate Fund (GCF) from Nepal in February 2019, enabling direct access to climate finance.

During the times of disaster, AEPC has been coming forward with the post-disaster response initiatives at various times. The most notable was post-earthquake response through renewable energy technologies after 2015 Earthquake: initially with the GoN funds and then through UKAid-supported big initiative and few others. Such initiatives of AEPC have been continuing to ease the lives of people affected by earthquake. This year also, after Rasuwa-Bhotekoshi and other flood incidents, AEPC collaborated with NDRRMA, NEA and other partners and delivered energy services, particularly through solar home lighting systems, institutional solar, solar lights and cookstoves.

The fiscal year 2025/26 (FY 2082/83) marked a remarkable progress for AEPC. The Centre implemented its programs under two budget headings: the Centre's core RE and EE initiatives achieved 84 percent physical and 85 percent financial progress, while the National Rural and Renewable Energy Program (NRREP), jointly funded by the GoN and DPs, achieved 86 percent physical and 96 percent financial progress. During the FY 2082/83 year, a total of 693 kW from micro and small hydropower projects and 604 kW from solar mini-grids were generated to power rural households, alongside the installation of 16,800 kW in solar rooftop systems. Clean cooking access was significantly boosted with the deployment of 119,500 technologies electric stoves, improved cookstoves and domestic biogas plants. In addition to two completed large-scale biogas facilities. Water security and agriculture were strengthened through two solar drinking water schemes, three micro-hydro operated lift irrigation projects, and 315 solar pumping systems for irrigation. Furthermore, AEPC completed the reconstruction of 15 disaster-damaged micro/small hydropower projects and successfully integrated one micro-hydro project into the national grid These achievements nonetheless reflect AEPC's strong institutional capacity and its commitment to delivering tangible energy solutions across the country.

The Central Renewable Energy Fund (CREF) continues to serve as AEPC's core financial mechanism, mobilizing subsidy, viability gap funding (VGF) and credit, guided by the principle of blended financing. The Sustainable Energy Challenge Fund (SECF), incorporated within CREF, serves as an innovative financing mechanism supporting sustainable energy projects developed by the private sector by providing VGF and technical assistance. With support from the UK Aid-funded Nepal Renewable Energy Program (NREP), the Centre mobilized financial and technical assistance to private-sector-led renewable energy initiatives under SECF. Similarly, the REEEP-GREEN program, supported by the German Development Cooperation (GDC) and the European Union through GIZ, further strengthened SECF operations and expanded opportunities for private investment in sustainable energy.

AEPC also advanced several major development-partner-supported initiatives during FY 2082/83. These include the Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal (DKTI program) supported by GDC through KfW; the South Asia Subregional Economic Cooperation (SASEC) program supported by the Asian Development Bank (ADB); and the Mini-Grid Energy Access Project (MGEAP) supported by the World Bank. Other ongoing projects include the Renewable Energy for Rural Livelihood (RERL) Project implemented with support from UNDP, ADB and Norway, as well as credit mechanisms such as the Micro Hydro Debt Fund (MHDF) supported by GIZ/EnDev and the Biogas Credit Fund (BCF).

The implementation of the GCF-funded project "Mitigating Greenhouse Gas Emissions through Modern, Efficient and Climate-Friendly Clean Cooking Solutions (CCS)" gained significant momentum during 2082/83. This five-year program will deploy 500,000 electric cookstoves, 490,000 Tier 3+ improved

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cookstoves, and 10,000 biogas plants across 150 local levels in 22 districts, directly benefiting around one million households. By replacing traditional biomass-based cooking practices with clean alternatives, the program will significantly reduce greenhouse gas emissions while improving indoor air quality, public health and gender equity in energy access.

In parallel, AEPC, serving as the delivery partner for the Ministry of Finance (MoF), successfully implemented the GCF Readiness and Preparatory Support Program (RPSP) to enhance national capacity for climate finance access and governance. Currently, AEPC's disaster-response project proposal (~20 million USD) to Fund for Responding to Loss and Damage (FRLD) is in final stage of approval. Likewise, another waste-to-energy project submitted to GCF has also been advancing well. Through these initiatives, AEPC has been collaborating with various partners to develop a robust pipeline of clean energy and climate projects for further engagement with the GCF, FRLD and other climate funds. These efforts reflect AEPC's growing role in mobilizing climate finance and integrating sustainable energy within Nepal's broader climate agenda.

As a GCF-accredited entity, AEPC aims to enhance Nepal's ability to mobilize climate finance, strengthen energy infrastructure resilience, and contribute meaningfully to national and global climate goals. The Centre will continue fostering partnerships with bilateral and multilateral agencies, international climate funds, sub-national governments, the private sector, civil society and all possible partners and stakeholders to achieve these priorities and goals.

AEPC continued to play a pivotal role in shaping Nepal's RE and EE policy landscape. Under the leadership of MoEWRI, the Centre contributed to the drafting of the Renewable Energy and Energy Efficiency Bill an important legislative milestone that has been approved by the Cabinet and tabled in House of Representatives. Enactment of this bill will provide strong legal basis and expanded mandate for RE and EE sector and transform AEPC into a new organization - Renewable Energy and Energy Efficiency Centre.

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

Looking ahead, AEPC remains committed to accelerating Nepal's clean energy transition through integrated and inclusive approaches. In the changed context, the national priorities include: energy access through off-grid RE solutions in remote areas; integration of distributed renewable energy (DRE) into the national grid; promotion of grid-integrated DRE for improved reliability and energy mix; adoption of energy efficiency initiatives across various sectors; and achieving clean energy transition in the domestic, transport, industrial and agriculture sectors.

I extend my heartfelt gratitude to the GoN, MoEWRI, MoF, Alternative Energy Development Board, CREF Investment Committee, development partners, private sector, financial institutions, academia, civil society organizations, community organizations, all our valued partners and stakeholders for the continued cooperation and collaboration. I commend the dedicated team of AEPC and its programs for their untiring contributions. Last but not least, I appreciate the team engaged in developing this publication and everyone who has contributed to the development of this publication in its current shape. Together, we will continue advancing Nepal's sustainable energy future for an inclusive clean energy transition and for building a sustainable and resilient energy future.

.....

Mr. Nawa Raj Dhakal
Executive Director

The National Agency Working for Renewable Energy and Energy Efficiency

ALTERNATIVE ENERGY DEVELOPMENT BOARD



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Biraj Bhakta Shrestha

Hon. Minister for Energy, Water Resources and Irrigation



VICE-CHAIRPERSON

Prof. Dr. Sudan Jha

Hon. Member, National Planning Commission



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MEMBER

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MEMBER

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Representative, NGOs



MEMBER

Usha Khatiwada

Representative, private sector



MEMBER SECRETARY

Nawa Raj Dhakal

Executive Director, AEPC

ORGANISATION STRUCTURE

Alternative Energy Development Board

Compliance and Ethics Sub-committee-Compliance Unit

Central Renewable Energy Fund

Executive Director

Personal Secretariat

Deputy Executive Director

Administrative Division	Planning and Monitoring Division	Technology Promotion Division
General Administration and Human Resource	Planning	Community Electrification
Financial Administration	Monitoring, Evaluation and Quality Assurance	Solar and Wind Energy
Procurement and Store	Climate and Carbon	Bioenergy
Information Technology	Gender Equality and Social Inclusion	Energy Efficiency
Outreach Management	Environmental and Social Safeguards	Productive Energy Use



AEPC office · Tahachal, Kathmandu

Executive Directors

30
YEARS
7 LEADERS



Shyam Lal Vaidya

Nov 1996 – Apr 2000



Dr. Madan Bahadur Basnyat

Apr 2000 – May 2006



Prof. Dr. Govinda Raj Pokharel

Aug 2006 – Dec 2008

Feb 2012 – Apr 2014



Dr. Narayan Prasad Chaulagain

Mar 2009 – Jan 2012



Dr. Ram Prasad Dhital

Aug 2014 – Aug 2018



Dr. Madhusudhan Adhikari

Feb 2019 – Feb 2023



CURRENT EXECUTIVE DIRECTOR

Nawa Raj Dhakal

May 2023 – present

Acting: Aug 2018 – Feb 2019

Acting: Feb – May 2023

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Electric cooking



Komas solar mini-grid



Solar irrigation pump

01 WHO WE ARE

Alternative Energy Promotion Centre

Established on **3 November 1996 (18 Kartik 2053 BS)** under the then Ministry of Science and Technology, the Alternative Energy Promotion Centre (AEPC) is a Government of Nepal institution dedicated to advancing renewable energy and sustainable energy solutions across the country. Today, AEPC operates under the **Ministry of Energy, Water Resources and Irrigation** as the **national focal agency for renewable energy and energy efficiency**, with an expanded mandate encompassing climate action, carbon emission reduction, resource mobilisation, quality assurance and support to provincial and local governments.

For three decades, AEPC has helped translate clean-energy policy into practical solutions that improve people's lives. Its interventions range from technologies serving individual households, such as biogas plants, improved and electric cookstoves, and solar home systems—to **community-scale** micro and mini hydropower plants, solar and solar–wind mini-grids, drinking-water and irrigation systems, and productive-energy applications. At **institutional, commercial and industrial scale**, AEPC supports solar rooftop, energy efficiency, fuel switching, large biogas and waste-to-energy systems, and other emerging clean-energy solutions.

Working in partnership with federal, provincial and local governments, development partners, financial institutions, the private sector, civil society and local communities, AEPC has helped make renewable energy and energy efficiency increasingly accessible, reliable and relevant to Nepal's development priorities.

VISION

An institution recognised as a regional and international example of promoting large-scale use of renewable and sustainable energy, including energy efficiency, and a national focal point for resource mobilisation.

MISSION

To make renewable energy and energy efficiency mainstream resources through energy accessibility, knowledge and adaptability, improving living conditions in Nepal and combating climate change globally.

What AEPC does

Light and energy
Micro-hydro, solar home systems, mini-grids, solar rooftop

Clean cooking
Biogas, improved and electric cookstoves

Water for homes and fields
Solar drinking-water and irrigation pumps

Livelihoods
Mills, dryers, enterprises and farms on clean energy

Energy efficiency
Audits, standards and fuel switching in industry

Climate and Carbon finance
Carbon credits and Green Climate Fund projects

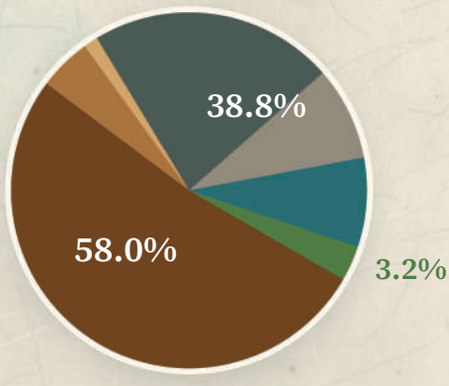
Firsts for Nepal

2005
Pioneer of climate and carbon finance
Household biogas is Nepal's first projects under the Clean Development Mechanism

2019
First Direct Access Entity
from Nepal to the Green Climate Fund

Clean Energy Where Nepal Needed It Most

1 Where Nepal's energy comes from



Total energy consumption by source, FY 2081/82 (12,019 thousand toe), as reported in the Economic Survey 2025/26.

503 PJ energy used FY 2024/25

Traditional 58.0%

Fuelwood **51.9%** Crop residue **4.8%** Animal dung **1.3%**

Commercial 38.8%

Petroleum products **22.2%** Coal **8.5%** Electricity **8.1%**

Renewable energy 3.2%

Solar, micro-hydro, biogas and others **3.2%**

> *Biomass made up 87% of Nepal's energy in 2009 and 58% today, yet more of it is burned in absolute terms, because total demand has roughly doubled.*

2 Three decades of change

Renewable energy in Nepal's energy mix

3.2% in 2026

from **0.015%** in 1996

Population with access to electricity

99.1% in 2026

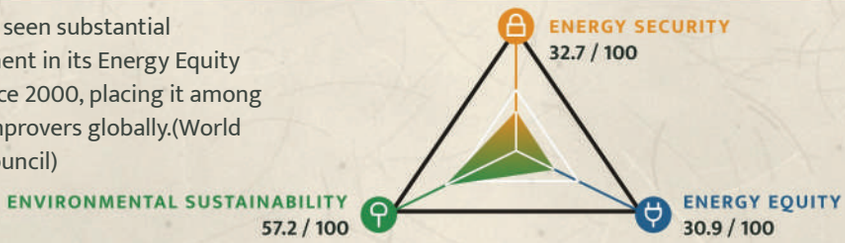
from **~15%** in 1996

Cumulative number of households

3.7 M+ in 2026

3 Nepal's world energy trilemma index

Nepal has seen substantial improvement in its Energy Equity scores since 2000, placing it among the top improvers globally.(World Energy Council)



RANK **91**

40.5 / 100
overall score, 2023

4 AEPC's contribution: kitchens first, then homes, fields and enterprises

CLEAN COOKING

2.24 million

clean cookstoves and household biogas plants

INSTALLED CAPACITY

150 MW+

renewable energy capacity installed

CLIMATE AND CARBON FINANCE

Total: USD 49 million

Received: USD 36M

Secured: USD 13M

PRIVATE SECTOR

500+

companies involved

GREEN JOBS

40,000+

jobs created

TIMELINE

Major Shifts

Formation Order and its amendments · Landmark · Milestone

FORMATION ORDER · NOVEMBER 3, 1996

1996 · Formation Order 2053

AEPC was established under the Ministry of Science and Technology to promote and develop alternative energy: mobilising resources, policy, planning and budgeting, coordinating national and international partners, and building capacity.

FORMATION ORDER · MARCH 23, 1998

1998 · First Amendment

Updated the governance structure of the Board.

FORMATION ORDER · MARCH 27, 2000

2000 · Second Amendment

Further clarified the scope of AEPC's work.

FORMATION ORDER · AUGUST 6, 2001

2001 · Third Amendment

AEPC may mobilise loans for alternative energy, directly or through legally established organisations, and set the interest rate.

FORMATION ORDER · DECEMBER 20, 2004

2004 · Fourth Amendment

Further updated the governance structure of the Board.

FORMATION ORDER · JULY 17, 2006

2006 · Fifth Amendment

Scope extended to alternative energy and renewable energy.

FORMATION ORDER · DECEMBER 19, 2011

2011 · Sixth Amendment

AEPC's hydro mandate extends to projects of up to 10 MW.

FORMATION ORDER · OCTOBER 30, 2018

2018 · Seventh Amendment

Energy efficiency added to AEPC's mandate, along with renewable energy work on climate change and carbon emission reduction.

2000
First Renewable Energy Subsidy Policy.

2005
AEPC enters carbon finance. Household biogas projects are registered under the Clean Development Mechanism, among Nepal's first.

2006
Rural Energy Policy sets the national framework for rural energy access.

2012
National Rural and Renewable Energy Programme (NRREP) was launched
Central Renewable Energy Fund(CREF) was established as intermediary financial mechanism

2014
Large biomass and municipal energy projects were introduced

2017
AEPC moves to the Ministry of Energy, Water Resources and Irrigation
GESI and Environmental and Social Safeguards policies adopted.

2018
AEPC graduated with Solar Mini-grids and community managed mini hydro projects

2019
Accredited to the Green Climate Fund as Nepal's first Direct Access Entity.

2021
Introduction of Viability Gap Fund(VGF) through the amendment of CREF operational manual

2022
Renewable Energy subsidy policy (2022)

2025
Eight carbon projects transitioned to Article 6.4.

2026

30TH ANNIVERSARY

- **3.7 million** households served
- **USD 49 million** Total carbon revenue
- **500+** companies
- **40,000** green jobs

- RE and EE Bill tabled in Parliament
- Carbon neutral green economy promotion

Programmes That Powered the Journey

Ongoing programmes

SASEC: South Asia Subregional Economic Cooperation
2015–2026 · ADB
USD 16 M
Mini-hydro; solar-wind mini-grids

MGEAP: Private Sector-Led Mini-Grid Energy Access Project
2019–2026 · World Bank
USD 7.6 M
Solar and hydro mini-grids; large biogas

CCS: Mitigating GHG Emissions through Clean Cooking Solutions
2022–2027 · Green Climate Fund
USD 49.2 M (GCF grant 21.2 M)
Clean cooking

DKTI: Promotion of Solar Energy for Rural and Semi-Urban Regions
2023–2027 · KFW (Germany)
EUR 9 M
Solar rooftop, solar mini-grids, solar irrigation pumping system

RERL: Renewable Energy for Rural Livelihood
2011–2028 · UNDP, ADB
USD 15 M
Mini and micro hydro
Solar PV and PEU

REEEP-GREEN: Renewable Energy and Energy Efficiency programme-Green Recovery and Empowerment with Energy in Nepal
2021–2027 · GIZ , EU
EUR 15.8 M
Policy and Governance, capacity development, energy efficiency promotion, outreach structures

Completed programmes





A solar irrigation pump in a field of yellow mustard

02

IMPACT

Achievement and Impact: Clean Kitchens, Lighting Communities, Green Fields

Clean cooking · Light and energy · Water and livelihoods · Energy efficiency · Private sector engagement and finance · Inclusion · Standard and Quality · Provinces and Local Governments · Disaster response · Fuel substitution and emissions reduction · Climate finance and carbon trade



At the inlet of a household biogas plant

"Reduced household air pollution, time saved gathering wood, and forest resources conserved. Counted by homes rather than kilowatts, clean cooking is AEPC's largest reach."

2.24 M HHs

clean cooking technologies installed with AEPC support, to the end of 2025/26

CLEAN COOKING

Making Smoke Free Kitchens

For most Nepali families, energy means cooking. Biomass burned in open fires still supplies most of the country's energy, and its smoke fills kitchens where women and children spend hours each day. Clean cooking is where AEPC has reached the most homes.

FOUR STEPS AWAY FROM THE OPEN FIRE · CUMULATIVE TO 25/26

1

1.42 million

Mud improved cookstoves

Built of local clay with a chimney, the first step out of the open fire for millions of rural homes.

2

459,345

Household biogas

Biogas from cattle dung for cooking and slurry for the fields. Biogas led Nepal into carbon finance.

3

205,601

Metallic improved stoves

stoves that burn wood more efficiently for homes; still cooking and heating with firewood.

4

149,960

Induction Stoves

Cooking with Nepal's own hydropower: clean in the kitchen and a new use for the grid.

Plus 380 institutional, urban and commercial biogas plants serving schools, farms and businesses.



A Tier 3+ improved cookstove at home

GREEN CLIMATE FUND · 2022–2027

Mitigating GHG Emissions through Clean Cooking Solutions

USD 49.2 million (GCF grant USD 21.2 million)

Physical Targets (1 Million):

500,000 electric stoves

490,000 Tier 3+ stoves

10,000 biogas plants

6.5 M t CO_2e to be avoided

- **47,274 electric cooking installations** through the Sustainable Energy Challenge Fund, delivered with private companies .

Energy from Water: Micro and Mini Hydro, Pico Hydro and Water Mills

For generations, night in the hills meant a smoky kerosene *lamp* and a dark walk home. Then light came from the stream below the village. With AEPC's support, communities built and ran their own energy long before the grid arrived, so children could study at night and health posts and mills could keep working. Now AEPC helps connect those projects to grid as the grid reaches them.



Haluwa Khola Mini Hydro, Ramechhap

41,345 kW
micro and mini hydropower installed

400,000
households served

11,104
improved water mills for agro-processing and electrification

THE FAMILY OF WATER-ENERGY TECHNOLOGIES, BY SCALE

SMALLER — LARGER

A HAMLET

Improved water mill

The traditional watermill (ghatta), upgraded for agro-processing and electrification

A CLUSTER

Pico Hydro

Pico hydro of up to 10 kW, made in Nepal, lighting a cluster of homes

A VILLAGE

Micro hydro

Community-owned plants running village grids, mills and workshops

MANY VILLAGES

Mini hydro

Larger plants serving many villages, able to sell energy to the national grid

WHEN THE GRID ARRIVES

A plant that loses it's consumers can remain operational by selling electricity to the grid.

Total Connected in the grid:16 MHPs and 1 SMG



Grid Connection at Shree Jhumsa Khola MHP



A microhydro plant

Energy from the Sun

Solar reached the homes no wire could: a panel on a tin roof, a battery and a few bulbs, carried up mountain trails. From single home it grew into village mini-grids, panels on schools, health posts and factories, and pumps in the fields. Nowadays solar rooftop is fastest-growing source of clean energy.



Solar home system in a mountain village

1,000,789
solar home systems lighting scattered houses



316.6 kWp solar rooftop, Yeti Carpet Industries, Birgunj, Parsa

47,738 kW
solar rooftop at institutions and businesses



Solar and wind mini-grid

4,079 kW
solar and solar-wind mini-grids running village networks



2 kWp institutional solar system

4,540
institutional solar systems for schools, health posts and offices



Solar street lights

3,309
solar street lights



Religious site

4,865
solar systems at religious sites

ENHANCED PRODUCTIVITY, LIVELIHOODS IMPROVEMENT, ENTERPRISE DEVELOPMENT

Energy to Green Economy

Through the promotion of Productive Energy Use, AEPC links clean energy to drinking water, irrigation, agro-processing and small and medium enterprises, so that energy raises incomes as well as living standards.



Solar Irrigation pumping system installed at Purnabas Municipality, Kanchanpur

Water for homes and fields

4,597
solar drinking-water and irrigation pumps

Livelihoods and enterprise

2,464
solar dryers and cookers

1,769
productive-use enterprises

33
institutional gasifiers



A tailoring enterprise working at night, Jumla



Solar dryers for agro-processing, Syangja, Waling

ENERGY EFFICIENCY

Every Unit Counts

Since 2018 AEPC has been the Government of Nepal's lead agency for energy efficiency. Nepal's third climate pledge, NDC 3.0 (May 2025), now sets 2035 targets for energy efficiency, clean cooking and local renewables

THE NATIONAL GOAL

2×

0.84% → 1.68%

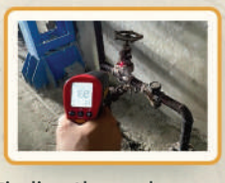
a year: doubling the pace of energy-efficiency gains by 2030 (National Energy Efficiency Strategy 2018)



Energy Manager Training Program, 2026



Energy auditors training, 2026



Finding thermal energy loss at a valve



MEPS workshop, 2026

WHAT AEPC DOES FOR ENERGY EFFICIENCY

- **Standards and labels for energy-efficient appliances**
- **Training energy managers and energy auditors**
- **Support for energy audits of industries and buildings**
- **Studies to set minimum energy performance standards (MEPS)**
- **Support and grants to switch to efficient equipment**

NDC 3.0: Nepal's 2035 targets where AEPC delivers

Efficient industry and buildings

70%	of industrial boilers electric (30% by 2030)
All	iron and steel plants on electric furnaces
1,500	Government buildings audited by 2030
2030	appliance labels, building certification

Clean cooking

2.1 M	households adopted e-cooking
15,000	institutions and firms on e-cooking
1 M	improved cookstoves in households
652,770	household biogas plants
750	units large-scale biogas plants (550 by 2030)

Local renewables

15%	of 28,500 MW from small hydro, solar, wind, bio
2,800	health facilities powered by solar
1,354	MWth of household solar thermal

Policy and local planning

National renewable energy and efficiency acts will be formulated by 2030

400	Local Governments with Energy Plans
100	Local Governments with efficient-building bylaws

Industry decarbonisation and waste to energy · by 2035 unless noted

75 MVA
waste-heat power in 16 cement plants (now 24.7 MVA in 4)

18
city waste-to-energy plants (from 7), plus 2 in SEZs

100%
Kathmandu Valley SMEs' furnaces and boilers electric

2030
equipment certification; emission standards for brick, cement, steel

500
technicians trained in cement, brick, steel and tiles

Track
energy emissions of industries

Sustainable Energy Challenge Fund

AEPC has moved from paying for systems to bringing in private investment. The Sustainable Energy Challenge Fund (SECF) bridges the gap by providing Viability Gap Funding (VGF), enhancing the financial viability of the project.

Viability Gap Funding: how it works

WHAT IT IS

Public money that covers the part of a clean-energy project's cost it cannot earn back, so that a marginally feasible project becomes bankable and private developers build it. AEPC has set up the SECF under the Central Renewable Energy Fund.

HOW IT PROCESSED

Competitive and two-stage: concept notes, then full applications reviewed by an Independent Evaluation Panel and approved by a CREF.

WHAT SECF HAS DEVELOPED

The fund backs the projects that deliver the most clean energy for the least public money. 110 projects of worth NPR 3,837,810,545 have already been completed.

VGF WINDOWS

01 Public-private partnership	*02* Demand aggregation	*03* Reverse auction	*04* System improvement
05 Other innovative projects	*06* Interest-rate buy-down	*07* Generation-based incentive	*08* Loan-loss guarantee

What SECF has delivered: physical achievements



Solar rooftop installed in Bhudeo Khadya Udhyog

47,274	electric cookstoves
26.1 MWp	solar rooftop
13	industries adopted fuel switching displacing fossil fuels
132	EV charging stations
360	electric rickshaws
189	irrigation pumping system
227	institutions and small businesses served
48,071 tCO_2e	estimated emission reduction

Women and the Marginalised First, by Policy



A solar mini grid powered ward office, Kalang, Dolpa

2



A solar irrigation pumping system installed by women farmer



60%

solar dryer users in Palpa and Syangja are women

In remote areas, women and girls bear the main burden of cooking, fuel collection, and household energy management. Clean energy directly reduces this workload. To ensure targeted impact, the AEPC prioritizes women and marginalized groups: through: its GESI Policy (2018) and Renewable Energy Subsidy Policy (2022).

GESI POLICY, 2018

Sets AEPC's commitment to gender equality and social inclusion across planning, subsidy, monitoring and staffing. AEPC's Gender Equality and Social Inclusion Section oversees it.

RENEWABLE ENERGY SUBSIDY POLICY, 2022

Affirmative action through additional subsidy for the Target Beneficiary Groups: women-headed households raising and caring for children, including minors; earthquake-affected people in affected areas; economically and socially disadvantaged groups; and Dalits and Indigenous Communities identified by the Government of Nepal as endangered

Where AEPC focuses

- **Program**
  Programmes aimed at women, marginalised and disadvantaged groups in remote communities
- **Affirmative Action**
  Responsive to Gender equality, disability and social inclusion in every programme
- **Youth**
  Green jobs and entrepreneurship: courses and training for young people
- **Enterprise**
  Support for productive energy enterprises, many run by women

Clean Energy, Closer to Home

In federal governance structure, provincial and local governments play a central role in determining development priorities and infrastructure investments. AEPC works in close coordination with these governments to facilitate community-driven energy planning, promote locally prioritised renewable energy solutions, and encourage cost-sharing arrangements for their implementation

7
MoUs with Provincial Governments

753
AEPC works with all local levels

164
Municipalities have already developed municipal energy plans

150 local levels signed MoUs for the Clean Cooking Solutions programme



MEP launch programme: Halesi Tuwachung Municipality, Khotang

How AEPC collaborates with provincial and local levels

- Technical assistance and project preparation
- Project implementation support
- Partnership in financing and implementation
- Provincial and Municipal Energy Plans
- National RE MIS and data exchange
- Quality assurance and monitoring
- Capacity development

Planning from the ground up. A Municipal Energy Plan maps local demand and resources before technologies are chosen. Nepal's NDC 3.0 aims for 400 such plans by 2035, 164 have already been developed.

Next: provincial service hubs. AEPC's roadmap adds Provincial Renewable Energy Service Hubs, so that technical assistance sits closer to the sub national government.

Projects are co-financed with local governments and user committees; continuing the renewable energy conditional grant keeps them on time.

DISASTER RESPONSE

Standing when disaster strikes

When the earth shakes or the rivers rise, energy lines fall and fuel runs out first. Again and again, AEPC has brought light, energy and clean thermal energy to the families hit hardest, and then helped rebuild the energy systems the disaster destroyed.



Solar systems for flood-affected families, Bhotekoshi, 2026

2015

EARTHQUAKE


Improved cookstoves for earthquake-affected families, Gorkha,2015

Gorkha earthquake: reviving village energy, lighting public buildings

The April–May 2015 earthquakes devastated 14 districts of central Nepal, where many villages were relied on micro-hydro and solar. AEPC assessed and repaired damaged plants and installed solar energy at households, schools, health posts and offices as part of a relief and rehabilitation package, along with solar mobile-charging. AEPC also supported rehabilitation of micro hydro plants and biogas plants

WHERE AEPC PROVIDED RELIEF

- Damaged micro-hydro plants rapidly assessed
- Micro-hydro systems supported
- Institutional solar systems for relief

RE's contribution to post-earthquake recovery and reconstruction

AEPC SPECIAL IMMEDIATE RELIEF PACKAGES

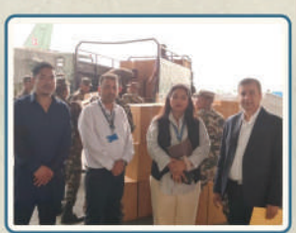
- **11,640** solar tukis
- **24,000** improved cookstoves (ICS)
- **240** mobile charging stations installed
- **200** solar camp lights for shelters

THROUGH DFID SUPPORT

- Solar tukis to **148,661** households
- **44** micro-hydro plants revived
- **120** institutional solar PV systems (ISPS)
- **17,613** biogas plants assessed; **5,330** rehabilitated
- **23,389** improved cookstoves (ICS)

2026

FLOOD


Relief supplies for flood-affected areas

Rasuwa/Bhotekoshi and Budhigandaki floods: light and thermal energy within days

When flash floods struck on 26 August 2026 (Rasuwa/Bhotekoshi), October 2026(Budigandaki) , the Ministry tasked AEPC, with the Nepal Electricity Authority, to restore basic energy services. Within days solar systems reached ward offices and health posts in Rasuwa, Nuwakot and Dhading

650
solar home systems (20 Wp) to affected families

10
institutional solar photovoltaic systems

2,000
metallic improved cookstoves, via local governments

With the collaboration with private sector supported 105 home systems, 1000 solar lights, 4 Institutional systems and 10 institutional metallic stoves

Standing when disaster strikes

After floods, landslides and a tornado between 2019 and 2024, AEPC's relief reached families in six districts. Its rebuild work then restored eight micro-hydro plants in seven districts.

A Major Relief support after disasters(2019-2024)

DISASTER DATE	DISASTER NAME	AEPC SUPPORT
4 Nov 2019	Dolpa flood (17 Jun 2019)	350 solar systems (20 Wp)
26 Aug 2020	Lidi landslide, Sindhupalchok (14 Aug 2020)	100 solar systems (20 Wp)
12 Sep 2020	Dhorpatan flood and landslide, Baglung (2 Sep 2020)	32 solar systems (20 Wp)
8 Jul 2021	Parsa tornado (31 Mar 2019)	950 solar systems (10 Wp) and 1,000 improved cookstoves
8 Jul 2021	Manang flood and landslide (15 Jun 2021)	5 solar systems (5 kW)
June–July 2021	Helambu, Sindhupalchok (Melamchi and Indrawati floods, 15 Jun 2021)	42 solar systems (80 Wp)
June–July 2021	Panchpokhari, Sindhupalchok (Melamchi and Indrawati floods, 15 Jun 2021)	90 solar systems (80 Wp)
June–July 2021	Bahrabise, Sindhupalchok flood and landslide (8 Jul 2020)	58 solar systems (80 Wp)
June–July 2021	Ramaroshan, Achham (18 Aug 2020)	32 solar systems (20 Wp)
September 2024	2024 September flood and landslide (Bagmati Province)	200+ solar lighting systems and 5 Institutional Solar Photovoltaic systems

B Jajarkot earthquake 2023: seven micro-hydro plants rehabilitated

Seven micro-hydro plants in Jajarkot and West Rukum damaged by the 2023 earthquake. All seven are now rehabilitated and upgraded.

MICRO-HYDRO PLANT	KW	MUNICIPALITY, DISTRICT
Sankh Khola III	60	Musikot, West Rukum
Chun Khola II	27	Musikot, West Rukum
Gigagad	44	Aathbiskot, West Rukum
Kharakhara Khola	44	Aathbiskot, West Rukum
Sirpa Khola	31	Nalgad, Jajarkot
Sepu Khola	32	Barekot, Jajarkot
Simtara Khola	52	Barekot, Jajarkot
Total: 7 plants	290	3,250 households (about 14,000 people)



Powerhouse damaged by the 2023 Jajarkot earthquake

Households back on power include **85** women-headed, **724** Dalit and **350** Janajati households.

Cleaner Fuels, Lower Emissions

Every clean stove, solar light, biogas plant and electric boiler replaces something that burned: firewood, kerosene, diesel, LPG or furnace oil. This is what that change looks like, and what it saves. This is where AEPC impact is visible beyond numbers.

The kitchen. Clean cooking replaces firewood, dung and LPG.



Open fire: smoke, soot and firewood

→



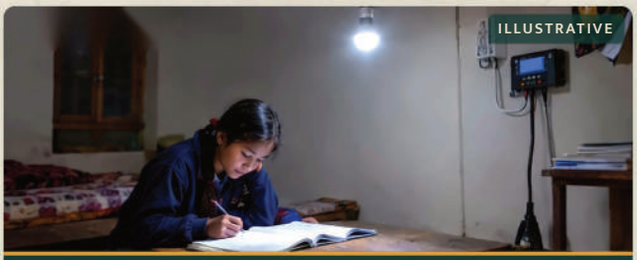
Electric cooking · clean cooking

The night. Solar home system, mini grids and micro and mini hydro replace kerosene and diesel lighting.



Homework by a kerosene tuki

→



Solar home system light · rural electrification

The field. Solar irrigation replaces diesel pumping and lets farmers grow crops in the dry season.



Diesel pump on a dry, cracked field

→



Solar irrigation pump · solar irrigation

The factory. Fuel switching replaced about 4.7 million litres of fossil fuel in 13 industries.



Fuel-fired furnace: flames and smoke

→



Clean, modern factory floor · fuel switching

A New Dimension: Climate Finance and Carbon Trade

Household biogas made AEPC Nepal's first earners of carbon credits in 2005. Nowadays climate fund and carbon revenue are a key resource for clean energy.

CARBON REVENUE, USD



DIRECT ACCESS ENTITY

28 February 2019

AEPC accredited to the Green Climate Fund: the first institution from Nepal, able to bring in climate finance directly.

2005

Clean Development Mechanism

Household biogas Nepal's first CDM projects; micro-hydro, cookstoves and water mills follow.

2013

Premium credits

Five biogas projects also certified under the Gold Standard.

2026

Paris Agreement to Article 6

All eight CDM projects transitioned to article 6.4

2026

Voluntary market

Ecozone improved cookstove project registered on VERRA.

Climate and carbon finance: project pipeline

Project or proposal	Funding Mechanism	Amount	Status
Waste to Energy	Green Climate Fund	USD 48.08 M	Submitted
Nepal RISE: recovery from loss and damage	Fund for Responding to Loss and Damage	USD 19.87 M	Submitted
Capacity to access climate and carbon finance	GCF Readiness, country window	USD 3 M	Submitted
Pipeline for the energy transition	GCF Readiness, DAE window	USD 0.996 M	Approved for submission
Waste to Energy	Article 6.2		Under development

CARBON GOVERNANCE

Putting carbon revenue to action

- Government of Nepal through cabinet decision mandated AEPC to mobilize carbon revenue, 8 January 2009.
- Terms of reference for Carbon Revenue Unit submitted to the Ministry and already implemented



National Forum on Clean Energy in Action, Kathmandu, 27 January 2026

With the Communities We Serve







The Hon. Minister for Energy, Water Resources and Irrigation and the Executive Director of AEPC with community members and officials during a field visit of Solar irrigation system, Bharatpur 22, Chitwan



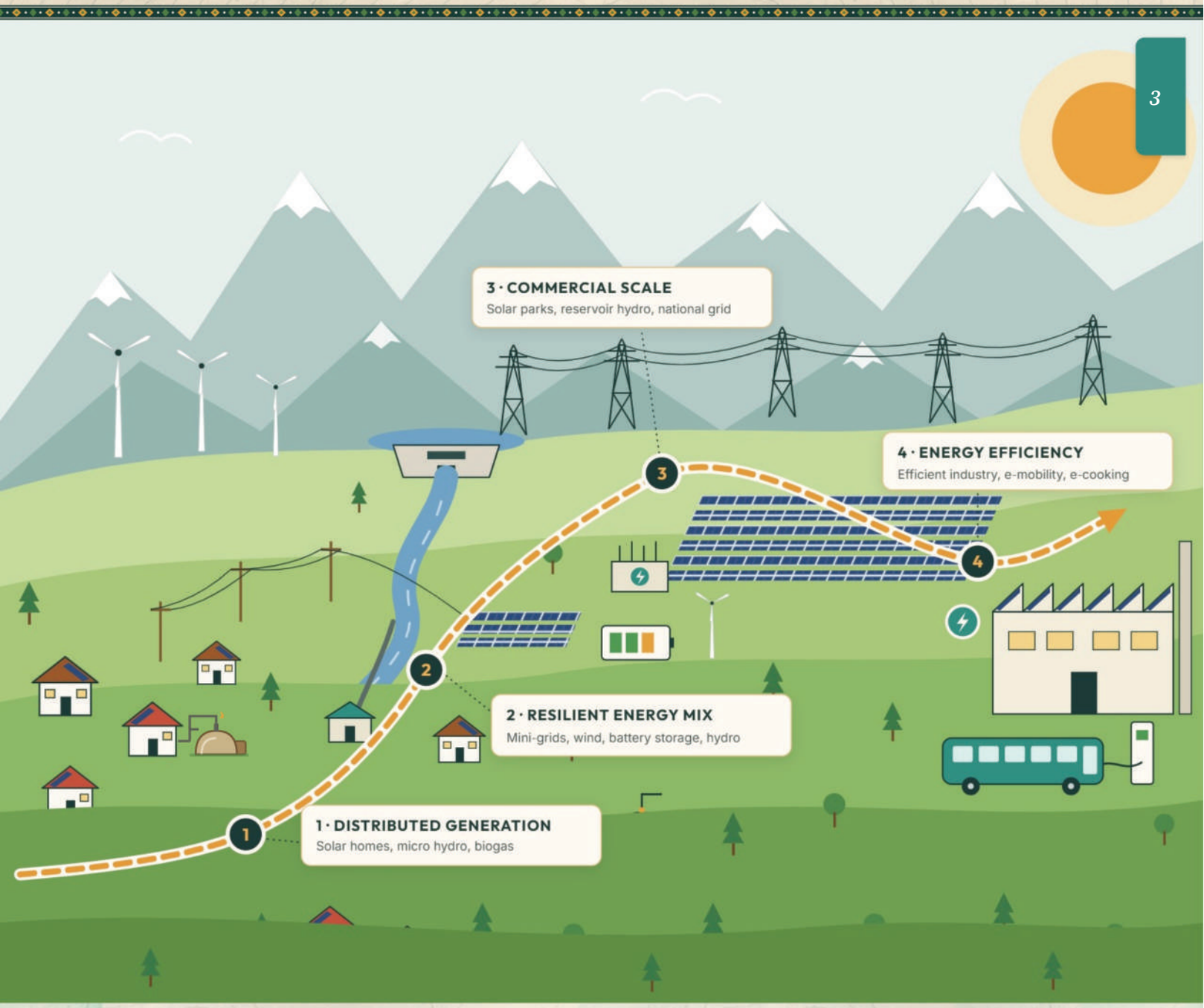
Bhedulla Khola Micro Hydropower Project (11 kW), Ward No. 3, Palata Rural Municipality, Palata.



Kalang Basic School, Dolpa electrified by solar mini-grid, Dolpo Buddha RM.

Single journey, many voices

Thirty years of clean energy look different from a ministry, a university, a company and a village. This chapter brings those views together: invited articles from policy, academia, the private sector and users, and an interview.



SOURCE: *An AI generated Illustrative for energy transition,*



Dr. Ram Prasad Dhital

Chairman, Electricity Regulatory Commission, Nepal; Former ED, AEPC

3

"Every micro hydro project that is technically sound and feasible should be connected to the grid."

Regulator's Perspective on Distributed RE Generation

"We have done remarkably well in bringing energy to the people. The next task is to make distributed generation technically sound, commercially viable and fairly regulated, so that it becomes a strength of the national system rather than a parallel to it."

Where my journey began

Today I work as a chief regulator of Nepal's electricity sector, but my foundation was laid in alternative energy. From the beginning of my career, my focus has been on promoting renewable energy and distributed generation. The years I spent with AEPC, first in promoting renewable energy technologies and later in leading the organization, shape the way I look at the sector even now.

From household access to commercial scale

When I led AEPC as Executive Director from 2014 to 2018, my priority was to upscale our energy interventions. In solar, that meant moving from watts to kilowatts. In hydro, it meant moving from kilowatts to megawatts. In biogas, it meant moving from household plants to industrial and commercial plants, and on to waste-to-energy. In short, we tried to move from the household to the institution.

The idea behind this was simple. In its early years, AEPC rightly focused on providing a basic necessity: a light bulb, a cooking fuel, a first level of access for rural households. Building on that success, we wanted to take the next step and make it commercial, where renewable energy is a productive, income-generating service.

A milestone in that direction was the agreement AEPC signed with the Nepal Electricity Authority (NEA) to pilot the grid interconnection of ten micro and mini hydro projects. The signing was witnessed by the then ministers and secretaries of energy and of environment. Its purpose was to take small-scale micro hydro beyond isolated village systems and into grid-connected systems.

What I see from the regulator's chair

Since taking up the chairmanship of the Electricity Regulatory Commission, I have come to appreciate the importance of those early interventions even more. Those pilots laid the groundwork, and the opportunity now is to take them to scale.

My view is clear. Every micro hydro project that is technically sound and feasible should be connected to the grid. Ninety-seven to ninety-eight percent of Nepali people now have access to electricity from the grid, so the era of isolated systems has to give way to strengthening the integrated system.

Reverse development

This is where I argue for what I call a reverse development model. In the traditional model, electricity is generated centrally and sent to the villages. Villagers consume it and pay for the service, and that money flows to the centre.

In the reverse model, projects are developed locally, in rural areas, and connected to the grid. The village sells electricity to the utility, and revenue flows *from* the centre *to* the village. That revenue can then be used to enhance local livelihoods and income. When distributed generation is interconnected in this way, it actively supports the development of the village. The same logic applies to solar. A rooftop or community solar system is no longer only a means of access; it can become a source of earnings.

What a robust regulatory framework must address

To realise this model at scale, Nepal now needs a robust regulatory mechanism for grid interconnection, whether for solar or hydro. In my view, that framework must address five areas.

1. **Technical integration.** Connecting small systems to a large network requires proper assessment of technical feasibility and safety. Grid and distribution codes, consumer service standards and utility standards all have to be applied and respected.
2. **Economics and commercial viability.** Most small interventions were built with grants and subsidies so that communities could be served first, and their commercial value has to be assessed separately. When such a project connects to the grid, what should the off-taker be expected to pay? We need to separate the subsidy component from the commercial component, and the utility should be asked to pay only for the commercial part. Only then will the utility be motivated to synchronize these plants. If projects are connected without that clarity, the system becomes vulnerable and the utility loses interest. We need financially strong distributed generation.

The utility's position also deserves understanding. NEA has signed long-term energy purchase agreements with independent energy producers to serve consumers. If a building that NEA supplies switches to solar or reduces its consumption, NEA still carries those commitments and its fixed costs. It is therefore reasonable for the utility to ask how its revenue and fixed costs will be protected. Bankable payment and tariff models that answer this question are essential, for developers and for the utility alike.

3. **Dispute resolution.** When disputes arise between a generator and an off-taker, not every issue should have to go to court. There must be a mechanism to address disputes quickly and fairly, and this is where an active regulatory commission matters, for large licensed systems and distributed systems alike.
4. **Consumer protection and equity.** All 30 million Nepalis have equal rights. A person living in Jumla deserves the same quality of service from the state as a person living in Kathmandu. Someone has to monitor whether consumers receive quality service, pay the right amount, get value for money, and face a fairly set tariff. Consumer protection must be streamlined for distributed systems too.
5. **Clear institutional demarcation.** Government interventions need a clear division of roles, including by geography. It is right for AEPC to promote energy in places like Jumla, but who does what, and where, must be clearly defined. The right organization must be placed in the right role and empowered accordingly.

The way forward for AEPC

As AEPC turns thirty, it is well placed to lead the next phase of Nepal's energy transition. I believe it can:

- **Graduate from a subsidy-led model to a market-based model**, reducing subsidies and increasing credit and financing.
- **Be developed as a centre of excellence**, with the institutional mechanism to match.
- **Upscale innovative financing**, such as challenge funds, from pilots to mainstream instruments.
- **Support communities in transition from off-grid to grid.** One option is for AEPC to work with local governments and communities so that a community buys energy in bulk from the utility and manages distribution itself, reducing losses and keeping value local.
- **Strengthen energy efficiency** as part of distributed energy, in cooking and above all in industry, where most of the potential lies.

The principles I hold to as a regulator are the same ones I would offer AEPC for its next decade: technical soundness, commercial and economic viability, fair dispute resolution, and protection of the consumer. If we build distributed generation on these foundations, the energy that AEPC took to Nepal's villages can become a lasting source of income and development for them.

Based on an interview with Dr. Ram Prasad Dhital, recorded for AEPC's 30-year commemorative publication, October 2026.

> *"All 30 million Nepalese people have equal rights. A person living in Jumla deserves the same quality of service from the state as a person living in Kathmandu.*
>
> DR. RAM PRASAD DHITAL



Dhawa Samduk Gurung

Chairperson, Shey Phoksundo Rural Municipality, Dolpa

3

"Electricity within their own settlements represents a significant change."

Light for the Remote Himalaya: Solar Mini-Grids in Shey Phoksundo

"These projects have demonstrated that essential services can be delivered even to remote Himalayan settlements through appropriate technologies, institutional collaboration and effective mobilization of resources."

I would like to express my heartfelt gratitude to the Alternative Energy Promotion Centre (AEPC), the Government of Nepal, the Ministry of Energy, Water Resources and Irrigation, KFW and all the organizations, development partners and technical personnel who supported the construction and installation of solar mini-grids in the settlements of Shey Phoksundo Rural Municipality and brought them to implementation.

A remote Himalayan municipality

Situated in the remote Himalayan district of Dolpa, Shey Phoksundo Rural Municipality holds a distinctive natural, cultural and tourism identity within Nepal. Its high-altitude terrain, scattered settlements, adverse weather, limited transport and communication facilities, and the high cost of carrying construction materials remain major obstacles to development. Despite these challenges, providing basic infrastructure and essential services, improving living standards and ensuring equitable access to development opportunities remain the Rural Municipality's key responsibilities.

Electricity is not only a basic necessity of modern life but also essential infrastructure for education, healthcare, communication, entrepreneurship, tourism, agriculture and livestock farming. Yet where the national grid is difficult to extend, reliable electricity has long remained a challenge. For remote local governments such as Shey Phoksundo, decentralized solar power has emerged as a suitable, practical and sustainable alternative.

Five solar mini-grids, 287 kWp

In Baisakh 2081 B.S. (April–May 2024), AEPC and Shey Phoksundo Rural Municipality signed an agreement to build solar mini-grids under a cost-sharing arrangement. Five projects have since been completed: Komas, Ward No. 1 (50 kWp); Karang-1 and Karang-2, Ward No. 2 (55 kWp and 22 kWp); Saldang, Ward No. 3 (110 kWp); and Mukporang, Ward No. 5 (50 kWp). With a combined installed capacity of 287 kWp, they have brought electricity to 445 households across five settlements.

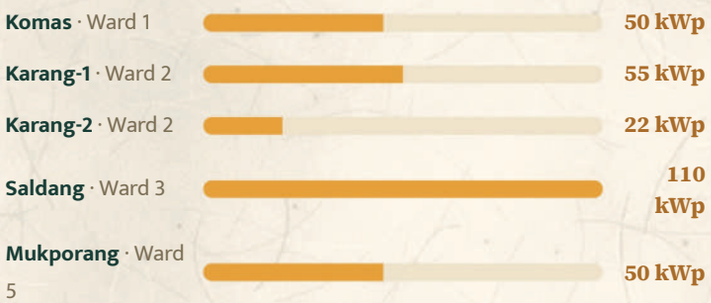
PROJECT HIGHLIGHTS

5
solar mini-grids, cost-shared

287 kWp
combined capacity

445
households connected

CAPACITY BY SITE



What electricity has changed

For residents who have faced difficulties for years because of remoteness and the absence of the national grid, electricity within their own settlements represents a significant change. It provides household lighting, enables the use of mobile phones and communication devices, supports children's education and the use of information technology, and eases many daily activities. Residents have experienced positive changes in their way of life, along with better access to modern services.

The achievements of these projects extend beyond physical infrastructure. Access to clean energy has created new opportunities and hope for local communities, and the projects show that essential services can reach even remote Himalayan settlements. Beyond meeting immediate household needs, these systems, now operational, can support the future expansion of local production, small businesses, tourism-related services and technology-based economic activities.

From construction to community ownership

Following construction and installation, AEPC handed the projects over to the respective User Committees through the Rural Municipality. This marks the transition from construction to regular operation, management, protection and long-term use. The User Committees will play a vital role in sustaining electricity services by fostering a sense of ownership and responsibility in their communities. The Rural Municipality views the handover not merely as a formality but as an opportunity to strengthen local participation, accountability and ownership.

The User Committees must now prioritize electricity distribution, tariff collection, management of operating expenses, regular maintenance and coordination for technical support. In remote Himalayan regions, protecting equipment, timely maintenance, the availability of technical personnel and sound management of maintenance funds are essential. The Rural Municipality is committed to strengthening the committees' institutional capacity, maintaining regular records of income and expenditure, raising users' awareness of their responsibilities, and coordinating with AEPC for technical assistance as required. I believe these efforts will keep the projects useful for the long term.

A word of thanks

AEPC's role in the conceptualization, technical preparation, cost-sharing arrangements, procurement, facilitation of construction and installation, and quality assurance of all five projects is highly commendable. On behalf of the Rural Municipality, I express my heartfelt thanks to AEPC for bringing the mini-grids into operation and handing them over to the User Committees. Despite the region's geographical complexity, transport and logistical difficulties, adverse weather and technical challenges, residents now benefit from electricity, a significant outcome of AEPC's support, technical expertise and institutional collaboration.

I also extend sincere gratitude to the Government of Nepal, the Ministry of Energy, Water Resources and Irrigation, GIZ and all supporting organizations, and to the officials, staff, technical personnel, construction contractors, local elected representatives and user communities involved in planning, construction, monitoring, quality assurance, operation and handover.

The road ahead

The completion of all five projects has strengthened our belief that renewable energy can improve living standards in remote areas. Yet electricity for every settlement and household in the Rural Municipality is still to be achieved. Given our terrain and the high cost of extending the national grid, the remaining settlements must be electrified with appropriate renewable energy technologies.

I firmly expect AEPC to continue supporting Shey Phoksundo Rural Municipality in identifying settlements and households still without electricity, assessing their needs and technical feasibility, and building new projects on a cost-sharing basis, expanding solar mini-grids and other suitable systems, according to local needs, where the grid cannot soon reach, so that more residents gain clean, safe and reliable electricity.

On this happy occasion, I once again thank AEPC and all supporting organizations. Shey Phoksundo Rural Municipality remains committed to clean energy, inclusive development and the prosperity of its residents, and I am confident our collaboration will grow stronger, to sustain these achievements and to bring electricity to the settlements that still lack it.

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> *"The happiness and satisfaction expressed by villagers upon gaining access to electricity reflect an important aspect of the projects' social significance.*
>
> DHAWA SAMDUK GURUNG

Nepal's Changing Relationship with Water

From Village Mills to Powering Industries in Bangladesh



Prof. Dr. Govind Raj Pokharel

Former Executive Director of AEPC

"Small is beautiful, but big can be bountiful."

Nepal's rivers begin in the Himalayas and flow through hills, valleys, and plains. They have long supported farms, villages, and cultural traditions. Today, they also provide electricity to homes, businesses, and industries. Nepal's use of water has grown from village mills to hydropower plants connected to national and international electricity grids. This is not only a story of larger machines. It is also a story of the people and institutions involved: communities that use and manage local systems, Nepalese businesses that manufacture and install equipment, government agencies that support development, and private companies that invest in larger projects. At every scale, the key questions are who benefits, who bears the costs, and how rivers and communities are protected.

Long before electricity reached Nepal's valleys, people used flowing water to do useful work. For generations, farmers built Ghattas beside streams. Water flowed through a channel and turned a wooden wheel, which moved a millstone to grind grain into flour. A Ghatta used local materials and practical knowledge. It needed no fuel or electricity from far away, saved time and effort, and helped families use the water near their homes. The people who used it knew the stream and understood how the mill worked. Water was part of everyday life, not simply a resource to be developed.

Over time, local makers improved water-powered machines. Metal parts and better designs made some mills more efficient. Later, generators allowed water to produce electricity as well as mechanical power. Small hydropower became especially useful in remote villages, where roads were difficult and the national grid was far away. Nepalese workshops and technical organizations adapted and made turbines for local conditions. Cross-flow turbines were used in some small plants. Another option was the Peltric Set, a compact system combining a Pelton turbine and an electric generator. Pelton turbines suit places where water falls from a great height but flows in a smaller volume. These technologies did not make the Ghatta disappear overnight. They expanded the ways people could use a stream. A small plant could provide lighting, support local businesses, and power community services.

Micro-hydropower helped build skills as well as provide electricity. Farmers, community groups, technicians, and workshop owners learned to operate and maintain equipment. Local businesses began manufacturing, installing, and repairing systems, while community organizations helped keep them running. In this way, small hydropower supported local knowledge and community management. Small plants also face challenges. Water flow changes with the seasons, equipment can break, and spare parts may be difficult to transport. A village plant cannot meet every need of a modern economy. Still, where extending the grid is difficult or costly, local hydropower can remain an important part of the energy system.

The Alternative Energy Promotion Centre (AEPC), established in 1996, has played a major role in further promoting and upscaling renewable energy technologies and expanding access in rural areas. It has supported small hydropower through technical assistance, subsidies, training, and planning. AEPC has linked the communities, government, development partners, and private sector and businesses. This support matters at each stage of a village project: finding a suitable site, choosing the right technology, arranging finance, training operators, and maintaining the plant. AEPC has helped build local capacity and encouraged private companies to supply equipment and services. AEPC has been acting as a nodal agency of the government of Nepal.

Estimates of small-hydropower potential differ by study and date. One AEPC assessment estimated about 80 megawatts of demand-based economic potential for pico- and micro-hydropower. Earlier estimates identified additional mini-hydropower potential, including sites considered by private developers and communities. These are planning estimates rather than a single, up-to-date measure of Nepal's total potential. They show, however, why small hydropower remains important for rural access and local economic activity. The renewable-energy sector creates work beyond the power plants themselves. Local businesses manufacture, install, and repair equipment, and technicians and community organizations help systems operate. With suitable support, small energy projects can create jobs and strengthen local services.

Nepal's first Mini-hydropower plant was built at Pharping and began operating in 1911. It had a capacity of 500 kilowatts and supplied electricity to Kathmandu, including the palaces and homes of the ruling elite. It demonstrated the potential of waterpower, but it did not bring electricity to the whole country. For many decades, larger hydropower projects were mainly planned and built by the state, often with support from international partners. These projects needed substantial investment, equipment, and technical expertise. They could provide far more electricity than a village plant, but they also affected larger areas and involved more people.

In the early 1990s, political and economic changes opened the electricity sector to greater private participation. The Hydropower Policy and Electricity Act of 1992 helped establish a framework for private investment. Independent power producers (IPPs) became increasingly important in developing and operating projects. IPPs can provide investment, technical expertise, and additional capacity, helping develop projects that the state may not be able to build alone. Their role has contributed to larger hydropower development and the supply of electricity to the national grid. Private investment, however, does not replace the need for good laws, public oversight, and responsible project management.

A hydropower project is more than an engineering plan. It is built in a particular place and can affect land, water, roads, livelihoods, and local expectations. Communities may seek jobs, electricity, roads, and support for local services. They also have a right to understand how a project may affect their lives. Benefit-sharing can include employment, community development, local electrification, royalties, and opportunities to invest in project shares. Small schemes are built by communities, own them and benefit from them. In many cases communities even sold surplus electricity to the grid, earning extra revenues. As per Govt policy, Megawatt level projects offer local people the opportunity to buy shares, subject to the relevant rules and arrangements. These benefits can help communities take part in a project's economic life. Construction can provide temporary jobs, and other benefits. For benefit-sharing are in different forms, jobs, clean electricity for different uses and many more. Community ownership and public participation play a critical role in building public support and smoothing the implementation of all scale of hydropower projects. As per government policy, in larger hydropower, by reserving 10% of equity shares for project-affected communities and 15% for the general public, infrastructure wealth is democratized, transforming local residents from bystanders into active co-owners. This equity participation allows citizens to benefit directly from long-term profits, dividends, and capital gains via shares. Ultimately, this shared interest aligns the goals of developers and local communities, reducing regional conflicts and fostering a virtuous cycle of mutual investment and goodwill.

Beyond direct financial benefits, these projects catalyze significant infrastructure development and economic growth in remote mountainous regions. The construction of access roads establishes permanent connectivity, opening previously isolated areas to broader markets, services, and opportunities. This newly available electricity and enhanced infrastructure stimulate local economies, causing supply chain demands to surge while hospitality and service industries flourish. But these benefits have to be meaningful, people need clear information, a genuine chance to express their views, and confidence that commitments will be honoured.

The national grid carries electricity from power stations to homes, businesses, and industries across Nepal. It spreads the benefits of electricity far beyond the river where the power is generated. Nepal has also begun exporting electricity to Bangladesh through India's transmission network. This marks a new stage in the story: electricity produced from Himalayan rivers can now help meet demand beyond Nepal's borders. This wider reach creates opportunities, but it also makes it important to remember where the power begins. Communities near a project may experience its direct effects, while users far away receive much of its electricity. Good planning must ensure that local people are heard and that environmental and social costs are taken seriously.

Rivers carry sediment, support wildlife, sustain farms, and hold cultural importance. A hydropower project may provide electricity and income while changing river flow and affecting local livelihoods. Environmental assessments can identify possible impacts before construction, but identifying a risk does not automatically prevent harm or repair it. Climate change makes careful planning more important. Changes in rainfall, snowmelt, and river flow can affect how much water is available and when. Projects, communities, and governments need to plan for these changes and monitor river conditions over time.

Nepal needs different scales of hydropower for different purposes. A Ghatta serves a local need. A micro-hydro plant can provide electricity to a remote village. Local manufacturers and installers supply equipment and services, while communities help manage and maintain small systems. AEPC and other government institution's support has been helping these projects succeed. Larger projects can supply the national grid and support industry, with IPPs contributing investment and technical expertise under public rules.

The phrase "small is beautiful, but big can be bountiful" captures this range. Nepal does not have to choose between small and large projects. It needs both, planned for their intended purpose and developed responsibly. AEPC's role is especially important in keeping small-scale renewable energy part of the national effort, while government, communities, local businesses, and IPPs all have roles in developing different scale of hydropower in the sector. From the miller who knew the stream to the power company connected to the national grid, Nepal's relationship with water has expanded from local use to national and international energy networks. The machines have changed and so have the people and institutions involved. The central question remains: How can Nepal use its rivers to improve lives, share benefits fairly, promote MSME in planning, designing, manufacturing, operating and investing as well as how Nepal can protect the places and people that depend on them.



Dinesh Kumar Ghimire

Former Secretary, Ministry of Energy, Water Resources and Irrigation, Government of Nepal

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"Clean energy transition should become its main focus, at both the national and international levels."

From Energy Access to Clean Energy Transition

By Dinesh Kumar Ghimire

An Institution Formed to Address the Energy Gap

Thirty years ago, Nepal had a large rural population and a significant energy-access gap. Extending the national grid to many rural areas was not possible or was prohibitively expensive. The Alternative Energy Promotion Centre (AEPC) was established to help provide energy access to every corner of rural Nepal through decentralized solutions, with support from the Development Partners and the Government of Nepal.

AEPC was founded to meet the needs of that time. Its responsibilities included exploring off-grid technologies, providing technical support, and arranging financial support and subsidies. The organization was established under the Bikash Samiti Ain and has carried out its duties within the mandates set by the government. However, its legal foundation remains weak. Until AEPC is given a stronger legal basis, it remains vulnerable to unpredictable government decisions. For this reason, the Renewable Energy and Energy Efficiency (REEE) Bill is necessary.

AEPC's Contribution and Continuing Relevance

As of 2026, 98–99% of Nepal's population has access to energy. Even so, AEPC remains relevant because of the country's international commitments and the Centre's changing role, including its potential to take a major role in the federal system as a lead agency in the sector.

AEPC has made substantial contributions over the past 30 years. Although Nepal has a small population, its distribution across rural areas makes energy access difficult. AEPC has played a critical role in addressing this challenge. Its work has included promoting off-grid energy and hydropower, contributing more than 40 MW of mini- and micro-hydropower projects, 30 MW of institutional and commercial solar power projects and more than a million solar home systems. Its contributions also include clean cooking, such as electric stoves, and the provision of financial and subsidy guidelines, including those for the Central Renewable Energy Fund (CREF).

A Changing Energy Landscape

Nepal's energy system cannot depend entirely on major grid-connected hydropower. Hydropower is a major resource, but it needs complementary resources; otherwise, the energy sector becomes vulnerable. Scaling up solar energy and commercializing it could provide that support, alongside emerging technologies.

The context in which AEPC works has also changed. Thirty years ago, the primary concern was energy access. Now that the grid has reached almost everywhere, AEPC's traditional role has declined. The Centre needs to draw on its highly experienced technocrats and experts to meet today's needs. Clean energy transition should become its main focus, at both the national and international levels, where Nepal has potential to contribute. This will require attracting investors, government facilitation, and becoming an early adopter before extending these efforts to neighboring countries.

AEPC is a major contributor to NDC3 under its national mandate. Its experience and expertise can support this work as the Centre takes on its evolving responsibilities.

Five Priorities for the Next Phase

The following five areas can help advance the clean energy transition:

1. Advance electric cooking. Electric cooking has many benefits, and AEPC should examine it through detailed analysis so those benefits can be assessed.

2. Work across levels of government and scale distributed energy. AEPC should work hand in hand with provincial and local governments on energy adoption. It should also commercialize and scale distributed energy in areas such as agro-processing, lift irrigation, and drinking water systems.

3. Adopt large-scale solar in public institutions. Large-scale solar should be adopted in hospitals and schools.

4. Strengthen the legal foundation. AEPC should work with the federal government to improve its outdated legal foundations. The REEE Bill must be passed by Parliament as soon as possible. AEPC should orient Members of Parliament and convince them of the bill's importance, while working closely with the government until it passes.

5. Strengthen finance and carbon-market work. Clean energy transition requires strong financial arrangements; the government cannot be the only source of support. International organizations, including the World Bank, also have a role. CREF needs improvement and more funding. AEPC is working on carbon trading under Article 6 of the Paris Agreement, but more work is needed.

The REEE Bill and AEPC's Future

The REEE Bill would transform AEPC into the REEE Centre, shifting its focus from alternative energy to renewable energy more broadly, in line with current needs. The proposed Centre would have a wider role—not only promoting renewable energy, but also supporting its commercialization and scale-up. The bill also provides for energy-saving certificates, mandatory energy audits and compliance, and certified auditors. The proposed model is similar to India's Bureau of Energy Efficiency (BEE).

For AEPC, the most urgent priority is passage of the REEE Bill. Securing that legal foundation would address the Centre's vulnerability and enable its transition into a broader role.

At the same time, AEPC needs to prepare for the change. It should formulate a plan for managing the transition immediately so that, once the bill passes, it can move properly into its next phase with the human resources and expertise the transition requires.

"The REEE Bill must be passed by Parliament as soon as possible."

DINESH KUMAR GHIMIRE · FORMER SECRETARY, MINISTRY OF ENERGY, WATER RESOURCES AND IRRIGATION

Scaling Up Distributed Renewable Energy in Nepal

Opportunities, Challenges, and the Way Forward



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"The central objective is not simply to generate more renewable electricity, but to ensure that its generation, distribution and commercial use contribute directly to sustainable and climate-resilient development."

1 Background and the Need for a New Approach

The Alternative Energy Promotion Centre (AEPC) has played an important role in promoting renewable energy technologies and expanding energy access across Nepal, particularly in rural and remote areas. As the country's energy infrastructure and electricity access have developed, there is a need to reconsider the existing approach to renewable energy promotion and identify ways to scale up these interventions. Traditionally, renewable energy interventions, particularly micro-hydropower projects, were regarded primarily as a means of providing basic energy services to communities with limited or no access to electricity. While this addressed an important development need, it did not fully explore the potential of these projects to become commercially viable energy-generating assets. The objective now should be to transform this approach into a commercially sustainable model by connecting technically feasible distributed renewable energy projects to the national electricity grid.

In 2014, an important initiative was undertaken to advance this concept. An agreement was signed with the Nepal Electricity Authority (NEA) to pilot the interconnection of ten micro-hydropower projects with the national grid. It was witnessed by the Energy Minister, the Environment Minister, the respective Secretaries, the Executive Director of AEPC, and NEA's then Managing Director, Kulman Ghising. The initiative recognized that small-scale renewable energy projects need not remain isolated systems; they could be integrated into the national network and participate in the larger electricity market. Having subsequently assumed responsibility as chairperson of the relevant commission, I have come to appreciate the importance of such interventions even more. Despite Nepal's considerable experience and leading position in small-scale renewable energy, we have not been able to scale up this approach as expected. Technical, economic, financial, regulatory and institutional barriers continue to limit its implementation.

2 Transitioning Towards Grid-Connected Distributed Generation

2.1 Transforming the Traditional Micro-Hydropower Model

One of Nepal's most important opportunities is to integrate technically feasible micro-hydropower projects into the national grid. Under a distributed generation model, micro-hydropower projects in rural communities could generate electricity locally and feed surplus or available electricity into the grid. In return, project developers or community institutions could receive revenue from electricity sold to NEA under an appropriate commercial arrangement.

This introduces a different approach to rural development. Rather than simply receiving electricity from the central grid, communities can turn locally generated electricity into a source of revenue, used to support local economic activities, improve livelihoods, strengthen local institutions and create further development opportunities. This can be understood as a form of reverse development: instead of relying exclusively on the central system to deliver electricity and development resources, rural communities themselves generate energy and obtain revenue from the central system.

2.2 Applying the Same Model to Solar Energy

The model is equally relevant to solar energy, particularly rooftop systems. Buildings, institutions, industries and households can install solar photovoltaic systems to meet their own needs and supply any surplus to the national grid, earning revenue or credits through an appropriate net-metering, net-billing or other approved payment arrangement. However, Nepal has not yet established a sufficiently robust regulatory mechanism to facilitate interconnection for all relevant distributed generation technologies, whether solar or hydropower. The technical, economic, commercial and regulatory requirements must therefore be addressed before large-scale implementation.

3 Technical and Economic Considerations for Grid Interconnection

A successful distributed generation framework must address two fundamental dimensions: technical feasibility and economic viability.

3.1 Technical Feasibility and Safety

Small renewable energy systems were generally designed to operate independently, and connecting them to a larger network introduces requirements that cannot be overlooked. The following aspects need to be evaluated:

- **Technical feasibility:** whether the system is suitable for connection to the existing distribution network.
- **Grid safety and system protection:** whether protection is in place against faults, disturbances and unsafe operating conditions.
- **Distribution and grid codes:** whether technical requirements for distributed generators are clearly defined and consistently implemented.
- **Consumer service and utility standards:** whether supply quality and reliability are maintained and the utility's technical and operational requirements are met.

- **Interconnection procedures:** whether standardized procedures exist for approving, installing, testing and operating these systems.

Even if a micro-hydropower project is technically capable of generating electricity, its integration must be assessed against the safety and reliability of the wider system. Technical standards and interconnection procedures must therefore be strengthened before large-scale synchronization is attempted.

3.2 Economic Feasibility and the Treatment of Subsidies

Many small-scale renewable energy projects in Nepal have been developed through grants and government subsidies, so the total investment may include a substantial subsidized component. When such a project is connected to the grid, an important question arises: what portion of its investment and costs should the off-taker, particularly NEA, be expected to recognize or compensate?

A distinction must be made between the subsidized and the commercially financed portions of the investment. The subsidy represents support already provided to achieve developmental objectives; the commercial component is the investment that must be recovered through electricity sales. Only relevant commercial costs and legitimate operating requirements should be built into the arrangement with the utility, rather than automatically transferring the entire historical project cost to the off-taker. A clear financial structure would help NEA assess the implications of connecting small projects and give it a stronger incentive to participate; without it, connecting numerous small, dispersed systems could create financial and operational uncertainty.

4 Addressing NEA's Financial Interests and the Economics of Solar Rooftop

A key challenge in promoting distributed generation is ensuring that the financial interests of the national utility are recognized. Consider a building that installs a solar rooftop system and significantly reduces its consumption from the grid. This may be attractive for the consumer, but NEA has already invested in transmission and distribution infrastructure and has entered into long-term power purchase agreements (PPAs) with independent power producers (IPPs). These commitments do not disappear when consumers switch to self-generated electricity. NEA may therefore face two major challenges:

- **Infrastructure and fixed costs:** substations, distribution lines, transformers and other infrastructure remain to be paid for even when a consumer buys less electricity.
- **Long-term contractual obligations:** NEA must continue to pay under long-term PPAs even when demand from particular consumers falls.

As consumers increasingly adopt solar rooftop and reduce their dependence on the grid, NEA may see lower sales while still carrying these costs. This explains why it may seek arrangements to recover the fixed costs of providing electricity services. Promoting solar rooftop and other distributed generation therefore cannot be treated solely as a matter of encouraging consumers to install renewable technologies. A suitable compensation mechanism must balance the interests of consumers, distributed producers, NEA and IPPs. The objective is not to discourage solar rooftop adoption, but to let distributed renewable energy grow without undermining the financial sustainability of the national electricity system. NEA must therefore be an active participant in designing and implementing the framework.

5 The Need to Transition Beyond a Subsidy-Led Implementation Model

The subsidy-led approach was important when a large proportion of Nepal's population lacked electricity and the priority was to extend basic services to remote and underserved communities. Circumstances have since changed considerably. With approximately 97–98% of the population having access to electricity through the national grid, the sector's priorities need to evolve. Remote communities beyond the practical reach of the grid may still need targeted support, but where grid access is available, the focus should shift to strengthening existing systems, connecting distributed generation and establishing financially sustainable energy services. The subsidy-led approach was implemented through successive phases, including around 2000, 2009 and 2014, and the sector now needs to examine how far the transition to commercially sustainable services has progressed.

A more diversified financing framework is necessary, including market-based and credit-based financing, private-sector investment, community investment and ownership, public-private partnerships, targeted subsidies for projects that cannot become viable without public support, and blended finance combining grants, concessional loans and commercial investment. The objective should be to gradually reduce dependence on direct subsidies wherever projects can become commercially viable. The viability gap funding (VGF) model that AEPC has introduced under the Sustainable Energy Challenge Fund (SECF) is an important step in this direction.

6 Regulatory Framework and Institutional Arrangements

Distributed generation requires more than technical standards and commercial agreements; a comprehensive regulatory framework is equally important.

6.1 Establishing Mechanisms for Dispute Resolution

Disagreements may arise between producers, utilities, distributors and consumers over contractual obligations, payments, technical responsibilities and service quality. Not every dispute should require the parties to approach the courts. A specialized regulatory mechanism should resolve routine disputes efficiently and fairly, which becomes more important as the number of distributed generators and local distribution arrangements grows. The regulatory commission must play an active role in supervising the system and ensuring that all stakeholders operate under clear and consistent rules.

6.2 Licensing and Regulation of Distributors

As distributed generation expands, the distribution structure may include community-based distributors, small-scale operators and micro-utilities alongside the national utility. The licensing framework must clearly define who may generate, purchase from the national utility and distribute electricity; the technical and financial conditions to be met; distributors' responsibilities towards consumers; how tariffs and service standards are determined; and how disputes and operational failures are addressed.

6.3 Consumer Protection

Consumers must be protected against unfair practices, poor service quality, unclear billing and unreliable supply. The responsibilities of generators, distributors and utilities must be clearly defined, and consumer protection should be integrated into the broader regulatory framework for distributed electricity systems.

7 Strengthening the Role of Local Governments and Community-Based Distribution

Nepal's constitutional mandate provides an important basis for greater involvement of local governments in electricity distribution and community-level energy management, within the applicable legal and regulatory framework. One approach would be partnerships between local governments, AEPC, NEA and community institutions. For example, a community could purchase electricity from NEA in bulk and distribute it among its members through an organized local distribution system. Such an arrangement could:

- **Reduce distribution losses** through local management and closer monitoring.
- **Increase community participation** in electricity management and distribution.
- **Improve accountability**, giving members a stronger role in supervising services.
- **Support local economic development** by keeping more distribution-related activity within the community.
- **Strengthen institutional partnerships** between AEPC, local governments and other organizations.

AEPC could help local governments identify suitable communities and develop the technical, financial and institutional models, supporting decentralization. These arrangements must, however, be backed by a clear legal, licensing, tariff and consumer protection framework to remain reliable and financially sustainable.

8 Geographic Targeting and the Role of Government Intervention

Government intervention must be based on clear geographical and institutional priorities. Promoting renewable energy in remote areas such as Jumla may be appropriate because of geographical constraints, infrastructure limitations and the cost of extending conventional services. Programmes should distinguish clearly between areas where grid extension is appropriate, areas where distributed generation can be integrated into the grid, and areas where isolated systems remain the most practical option, with the roles of AEPC, NEA, local governments and other institutions clearly defined. AEPC should focus where its expertise and mandate can generate the greatest impact, and support should be targeted rather than distributed indiscriminately, improving the efficiency of public expenditure and avoiding overlapping programmes or unnecessary subsidies.

9 Integrating Energy Efficiency into the Distributed Generation Framework

The expansion of renewable generation should not be viewed independently of efforts to improve how efficiently energy is consumed. Thermal applications, particularly cooking, remain important areas for intervention, but a considerable share of the efficiency opportunity lies in industry, where it can reduce energy consumption and operating costs, improve productivity and lower the overall demand on the energy system. The institutional responsibility for energy efficiency must therefore be examined, including whether AEPC has the appropriate mandate and capacity for industrial energy efficiency or whether agencies such as the Department of Industry should be more involved. The right organization should be placed in the right position, with the resources, authority and technical capacity to fulfil its responsibilities, and energy efficiency should remain connected to renewable energy planning.

10 Strengthening the Governance of Community-Based Energy Institutions

The sustainability of distributed generation will depend significantly on the governance and capacity of local energy organizations. Physical infrastructure alone does not guarantee long-term sustainability; community institutions and micro-utilities also need strong governance, clear financial management, operational accountability and the capacity to act in their members' interests. Several questions need to be addressed:

- Are existing community-based energy institutions adequately governed, with clearly defined responsibilities and accountability?
- Are financial management and revenue collection transparent?
- Do they have the technical and managerial capacity to operate their systems over the long term, and mechanisms to monitor performance and resolve internal disputes?
- Can they gradually become commercially sustainable local energy service providers?

Many community organizations already have considerable experience in managing small-scale energy systems. If distributed generation is to expand through community-based utilities, their institutional, financial, technical and governance capacities should be assessed and strengthened accordingly.

11 Conclusion: Towards a Sustainable and Scalable Energy Development Model

Nepal has made considerable progress in promoting renewable energy, expanding electricity access and developing decentralized energy systems. The next stage should transform these achievements into a more commercially sustainable, financially viable and institutionally robust framework, in which grid-connected micro-hydropower, solar rooftop, community-based distribution and industrial energy efficiency all play a part. Scaling up requires addressing several interconnected challenges:

- **Technical:** standards for grid interconnection, system protection, distribution codes and utility requirements.
- **Economic and financial:** suitable payment mechanisms, separating subsidy and commercial investment, and sustaining utilities and distributed generators.
- **Regulatory:** effective licensing, dispute resolution, tariff-setting and consumer protection.
- **Institutional:** clear roles for AEPC, NEA, local governments, regulators and community organizations.
- **Financing:** moving from an exclusively subsidy-led approach to market-based, credit-based and blended finance.
- **Governance:** stronger management, accountability and capacity in community institutions and micro-utilities.
- **Geographical:** interventions targeted to local needs, resources and the practicality of grid access.

Renewable energy projects should increasingly become productive, commercially viable assets that generate financial and developmental benefits for local communities. This does not mean eliminating subsidies altogether, but using public support strategically where commercial viability cannot be achieved independently, while helping viable projects access markets and sustainable finance. AEPC can contribute significantly to this transformation in partnership with NEA, local governments, regulators, the private sector and community-based institutions.

Ultimately, Nepal needs an integrated energy development model in which renewable generation, electricity distribution, financial sustainability, energy efficiency and local economic development reinforce one another. The central objective is not simply to generate more renewable electricity, but to ensure that its generation, distribution and commercial use contribute directly to sustainable and climate-resilient development.

> *"Nepal needs an integrated energy development model in which renewable generation, electricity distribution, financial sustainability, energy efficiency and local economic development reinforce one another."*
>
> DR. MADAN BAHADUR BASNYAT

Nepal's Sustainable Development Dream in the Face of Climate Change Threat

Energy, Economy, and Environmental Nexus



Dr. Narayan Prasad Chaulagain

Former Executive Director of AEPC

"Sustainable development in Nepal is not merely a policy goal; it is a vital strategy for survival."

1. Background

Because of the fragile ecosystems of the Himalayas, Nepal stands at a critical juncture in its development journey. As the nation has a vision of graduating from the Least Developed Country (LDC) status and achieving middle-income status under the Sustainable Development Goals (SDGs) framework, it faces a delicate balancing act. At the heart of this challenge lies the **Energy-Economy-Environment (3E) Nexus**, an interconnected framework where energy generation drives economic productivity, economic growth consumes natural resources, and environmental degradation threatens the viability of both as stated below:

- **Energy** acts as the engine of modern economic expansion and industrial transformation.
- **Economy** requires infrastructure, capital investment, and resilience to sustain growth and eradicate poverty.
- **Environment** provides the natural resources —glaciers, river basins, forests, and biodiversity—upon which energy generation and rural livelihoods depend.

Despite Nepal's low carbon footprint—contributing less than 0.1% to global greenhouse gas (GHG) emissions—it faces extreme climate vulnerability. The Hindu Kush Himalaya (HKH) region is warming at rates significantly higher than the global average. Rising temperatures accelerate glacier retreat, alter monsoon dynamics, and increase the frequency of extreme weather events such as:

- Flash floods and landslides including glacier / rock collapse and permafrost melting
- Glacial Lake Outburst Floods (GLOFs) and Landslide Dam Outburst Floods (LDOFs)
- Prolonged droughts

This structural vulnerability threatens to undermine decades of economic progress, illustrating that economic growth in Nepal cannot be decoupled from climate resilience and environmental stewardship. These climate-induced disasters pose systemic risks to public safety, agricultural productivity, physical infrastructure, and the macroeconomic stability of the nation. Unlocking Nepal's national potential requires an understanding how its vast natural assets—specifically its water resources—can fuel an industrializing economy without triggering self-defeating environmental feedback loops. Sustainable development in Nepal is not merely a policy goal; it is a vital strategy for survival.

2. Hydropower, Renewable Energy, and Energy Efficiency

Energy acts as the fundamental catalyst bridging Nepal's environmental wealth with its economic aspirations. Nepal's strategy to achieve sustainable economic growth relies heavily on its vast clean energy potential. Driven by glacial-fed rivers flowing from high Himalayan elevations to the southern plains, Nepal possesses an estimated theoretical hydropower capacity exceeding 83,000 MW, with over 40,000 MW deemed economically viable.

In recent years, Nepal has made significant progress in energy access, bringing over 98% of its population onto the electricity grid (both on- and off-grid) and transforming from a energy-deficit nation reliant on load-shedding into a net-electricity exporter to regional neighbors.

The Role of Hydropower and Solar Energy

Hydropower serves as the primary engine for clean energy transition. Large-scale hydropower projects provide clean baseload electricity, reducing domestic dependence on imported petroleum products, lowering the trade deficit, and supplying clean energy for cross-border trade. However, relying almost exclusively on run-of-river (RoR) hydropower project presents operational risks during the dry winter months when river flows drop significantly. Additionally, over-relying on hydropower alone for country's energy system planning seems to be a bit risky approach because of the increasing risks of climate change induced extreme events, e.g. recent floods in Rasuwa/ Nuwakot and Gorkha districts. To mitigate this seasonal shortfall, Nepal is promoting energy diversification:

- **Utility-Scale Solar Energy:** Integrating solar photovoltaics (PV) creates complementary energy profiles, generating maximum electricity during clear winter days when river levels fall.
- **Micro-Hydro and Decentralized Off-Grid Systems:** Micro-hydro and isolated solar mini-grids supply electricity to remote mountain communities where grid extension remains technically difficult and economically impractical.

Enhancing Energy Efficiency

Expanding electricity generation capacity alone is insufficient without managing demand side of energy through energy efficiency measures including affirmative policies and actions:

- **Electrification of Transport:** Transitioning private and public transport fleets to Electric Vehicles (EVs) reduces petroleum import bills and urban air pollution.
- **Clean Cooking Solutions:** Replacing traditional biomass and imported Liquefied Petroleum Gas (LPG) with electric stoves improves indoor air quality, reduces respiratory illnesses, and protects forest ecosystems.

- **Industrial and Building Energy Efficiency Standards:** Implementing energy-efficient building codes and industrial energy management practices maximizes the value of generated energy and increases the productivity and competitiveness of goods and services.

3. Development Dilemma under Climate Change Risks

Despite the promise of clean energy, Nepal faces a fundamental structural paradox: **the very natural assets driving its green energy development strategy are extremely vulnerable to climate shocks.**

Cascading Hazards and Infrastructure Vulnerability

Higher global temperatures lead to accelerated snow and glacier melts including permafrost melts. Increased snow/glacier melts and decreased snowfall (which results in reduced albedo/reflectivity and increased absorption of solar energy) compared to rainfall in high mountain regions due to increased temperature further accelerate the warming in high mountains. This will alter river hydraulics and increase geohazard exposure resulting in increased vulnerability of hydropower generation and physical infrastructures. Nepal's steep topography and weak/ dynamic geology make its river basins prone to cascading multi-hazard events:

- **Glacial Lake Outburst Floods (GLOFs):** Warming atmospheric temperatures lead to rapid retreat of Himalayan glaciers, forming unstable glacial lakes that risk breaching moraine dams.
- **Avalanche, Glacier/Rock Collapse, Permafrost Melt and Landslide-Dam Outburst Floods (LDOFs):** Glacier collapse, permafrost melt, avalanche, heavy or unseasonal precipitation triggers massive slope failures, damming rivers upstream before catastrophic breaches release millions of tons of water and sediment downstream. With increased temperatures, permanent snowlines are moving upwards in the mountains. This results in decreased ratio of snowfall-to-rainfall and increased risks of glacier/rock collapse posing heightened risk of floods in the high mountains and along the valleys downstream.
- **Sedimentation and Scour:** Excessive sediment loads scour hydro turbines, fill reservoir capacities, and reduce plant efficiency and infrastructure design life.

The Economic and Environmental Balance

This vulnerability exposes a structural conflict across the Energy-Economy-Environment (3E) nexus:

- **Economic Pressure vs. Climate Vulnerability:** Financing mega-infrastructure projects requires significant resources and capital. If a single extreme weather event damages or destroys even a single project, the financial burden falls heavily on the national economy. The economic pressure/losses will be in multifold when a single extreme event hits multiple project like in the recent Rasuwa/Nuwakot flood.
- **Resource Extraction vs. Ecosystem Conservation:** Building dams, access roads, and transmission corridors require clearing forests and altering aquatic habitats. Unchecked construction can degrade ecosystems, reduce community resilience, and trigger localized landslides.

Lessons from Recent Flood Disasters: Bhotekoshi /Trishuli and Budhigandaki Floods

The economic and human vulnerabilities of Nepal's energy-infrastructure corridor are illustrated by recent climate-induced disasters:

- **The Bhote Koshi / Trishuli Flood Disaster:** A high-altitude rock-ice mass detachment triggered a debris flow and flash flood along the Lhende Khola, Bhote Koshi, and Trishuli river corridors. The surge destroyed downstream gauging stations, bridges, transmission lines, settlements, and damaged operational and under-construction hydropower facilities. The financial loss to critical physical infrastructure reached tens of billions of Nepalese rupees.
- **The Gorkha / Budhigandaki Flash Flood:** A sudden flash flood carrying heavy debris struck the Budhi Gandaki river basin in Gorkha district, damaging bridges, riverbed markets, and local hydropower projects.

These compounding events demonstrate how single extreme episodes can disrupt national energy supply networks, burden fiscal resources, and raise insurance costs for infrastructure investments.

4. Challenges and Ways Forward for Nepal

To protect its sustainable development aspirations, Nepal must pivot from reactive disaster response to systemic risk management and climate-resilient economic planning.

Challenge Domain	Key Bottlenecks	Strategic Ways Forward
Infrastructure Design	Infrastructure designed and built using historical hydrological data without adequately accounting for climate change risks.	Integrate dynamic climate modeling, GLOF/LDOF risk assessments, and multi-hazard safety factors into asset site selection and design.
Financial Constraints	High capital costs for infrastructure with high exposure to uninsurable climate risks.	Mobilize international climate financing (Green Climate Fund, Loss and Damage Fund) and issue green/catastrophe bonds.
Early Warning Systems	Short lead times for high-velocity mountain flash floods limit downstream protection.	Expand transboundary monitoring networks, real-time sensor technologies, and automated early warning systems across river basins.
Policy & Governance	Inter-agency silos between energy, forestry, environmental, and disaster management bodies.	Enforce integrated river basin management (IRBM) and align local infrastructure planning with national adaptation frameworks.

Key Strategic Imperatives

1. **Climate-Proofing Infrastructure:** Hydropower designs must incorporate enhanced spillway capacities, advanced sediment bypass tunnels, and robust physical protections against flash floods and high sediment loads.
2. **Energy Portfolio Diversification:** Over-reliance on run-of-river hydropower leaves the grid vulnerable to seasonal flow reductions and extreme flood disruptions. Scaling up solar, wind, storage systems, and pump-storage hydro provides energy resilience.
3. **Loss and Damage Advocacy:** Nepal should leverage global climate forums (e.g., UNFCCC) to secure grant-based finance, compensation for loss and damage, and technical support to mitigate vulnerabilities created by global emissions.
4. **Community-Based Adaptation:** Integrating local community knowledge with engineering solutions enhances emergency preparedness, protects riparian ecosystems, and builds local economic resilience.

5. Conclusion

Nepal's dream of sustainable development through the Energy–Economy–Environment nexus remains achievable, but it requires a fundamental recalibration. The events along the Trishuli and Budhigandaki river corridors highlight the risks of treating infrastructure development independently from Himalayan climate dynamics. By embedding climate resilience into energy investments, diversifying the energy mix, strengthening disaster governance, and securing international climate and carbon finance, Nepal can protect its economic trajectory and build a sustainable future in an era of climate change.



Dr. Madhusudhan Adhikari
Former Executive Director, AEPC

AEPC Catalyzing Nepal's Clean Energy Transition

A Three-Decade Journey of Institutional Excellence and the Path Forward

1. Background

The Alternative Energy Promotion Centre (AEPC) has been a cornerstone of Nepal's decentralized renewable energy deployment. Established on November 3, 1996, as a semi-autonomous government body was mandated to bridge the massive energy access gap in geographically isolated communities nationwide. Over its nearly 30-year history, AEPC has evolved from a localized subsidy-disbursing mechanism into a sophisticated "Center for Excellence" for renewable energy and energy efficiency. Today, it serves as a premier technical agency directing national renewable energy programs, implementing large-scale energy efficiency strategies, and securing complex international climate and carbon finance pathways.

By embracing the Public-Private Partnership (PPP) model, driven by a demand-driven service approach, AEPC has successfully linked the private sector's technical capacity with institutional and financial backing from the Government of Nepal (GoN) and international Development Partners (DPs). Through this cooperative landscape, decentralized clean energy solutions have been delivered to more than 3.6 million households. This extensive deployment has transformed rural livelihoods, supported remote public institutions, and positioned renewable energy as a core mechanism for achieving Nepal's ambitious target of net-zero carbon emissions by 2045.

2. Three Decades of Technological Proliferation

Throughout its existence, AEPC has driven the deployment of a diverse mix of alternative energy solutions. These interventions have provided clean, reliable electricity, substituted high-emission traditional cooking methods, and introduced sustainable mechanical energy to the agricultural and commercial sectors.

The cumulative technological progress achieved up to date reflects the monumental scale of this institutional outreach[1].

- **Decentralized Electrification Milestones** The technological footprint of AEPC's rural electrification campaign is highlighted by a combined capacity of more than 85,000 kilowatts (kW/kWp) of decentralized clean energy generated across the country. This robust energy matrix includes around 41,000 kW sourced from micro/mini-hydropower schemes that utilize Nepal's abundant river networks, alongside a rapidly growing footprint of solar infrastructure comprising 4,000 kWp in localized mini-grid networks and around 40,000 kWp in commercial, industrial, and institutional solar rooftop and household-level solar home systems applications. Together, this off-grid capacity forms a vital energy base that operates alongside grid expansion to deliver modern energy solutions to geographically remote communities.
- **Clean Cooking Proliferation** AEPC's clean energy interventions have driven a major shift in residential energy use, providing over 2.20 million rural households with modern, smoke-free cooking solutions. By actively replacing high-emission traditional biomass fuels, this initiative has deployed 1,500,000 improved mud cooking stoves (ICS), 157,000 portable metallic stoves, and 83,000 energy-efficient induction cookstoves across Nepal's diverse terrains. Backed by 460,000 domestic biogas installations, this large-scale transformation has reduced household dependence on imported fossil fuels, mitigated indoor air pollution, and improved public health outcomes for rural families.

3. The First Mover in Introducing Modern Electricity to Remote Frontiers

AEPC's historical legacy is defined by its role as a bold "first mover" in introducing modern electricity to Nepal's most remote, marginalized, and topographically challenging terrains. Long before mainstream infrastructure could navigate the country's rugged mountain passes and deep river valleys, off-grid decentralized technologies served as the sole lifeline for basic human development.

By deploying isolated micro-hydropower plants and solar home systems, AEPC effectively broke the cycle of energy poverty in rural districts. This initial wave of rural electrification achieved several key milestones:

> *"Off-grid systems are not merely temporary stopgaps, but vital components of an inclusive national energy strategy."*

[1] *Data source: Published in AEPC Annual Report 2024/25, approximated to a round figure in thousands.*

- **Replacing Hazard-Prone Lighting**: Displaced traditional, toxic kerosene lamps and resin-soaked wood, instantly mitigating severe indoor air pollution and residential fire hazards.
- **Transforming Social Infrastructure**: Powered rural health posts, localized vaccine refrigeration, and communication equipment, while enabling digital learning environments in mountain schools.
- **Spurring Rural Economies:** Supported the introduction of Productive End Use (PEU) activities, such as agro-processing mills, cold storage facilities, and carpentry shops, directly raising household income and local employment.

This pioneering effort successfully demonstrated that off-grid systems are not merely temporary stopgaps, but vital components of an inclusive national energy strategy.

4. The Grid Convergence: Long-Term Sustainability Challenges

While decentralized off-grid installations achieved remarkable early success, the subsequent expansion of the national grid has triggered a complex sustainability paradox. As the Nepal Electricity Authority (NEA) steadily advances mainstream transmission lines into previously isolated rural pockets, community-managed off-grid systems face operational, financial, and structural challenges:

The Economics of Scale and Changing Demands

Community-managed mini-utilities typically operate on delicate, localized tariff structures designed primarily to cover basic operational maintenance costs and a solitary plant manager's salary. When the national grid arrives, consumers are exposed to the economies of scale offered by a centralized utility. The national grid provides highly stable, high-capacity energy capable of driving heavy industrial loads that isolated micro-hydropower plants or modest solar arrays cannot support. As a result, local consumer demand shifts rapidly toward the national grid. This drop in local consumer utilization erodes the revenue base of off-grid community utilities, frequently forcing them into financial insolvency and leaving millions in localized capital investments physically stranded.

Technical Depletion and Management Fractures

Off-grid systems are structurally vulnerable to long-term technical depletion. After a decade of continuous performance, community assets, including turbine runners, battery banks, and localized distribution networks, require substantial capital injections for complete overhauls. Without robust reserve funds, and facing a declining consumer base as the grid approaches maturity, community user groups frequently lack both the financial resources and the specialized engineering expertise required to maintain these systems. This combination often leads to a premature breakdown of the localized clean energy infrastructure.

5. Carbon Finance-Green Climate Fund and Carbon Revenue Generation

AEPC has successfully elevated Nepal's renewable energy achievements into substantial global equity. By transitioning from a traditional recipient of international aid to an active participant in global carbon markets, the Centre has institutionalized climate mitigation as a self-sustaining revenue engine.

Direct Access and the GCF Portfolio

In 2019, AEPC achieved a major institutional milestone by becoming the first accredited Direct Access Entity (DAE) to the Green Climate Fund (GCF) from Nepal. This unique status allows the Centre to directly access international climate and carbon finance for mitigation and adaptation projects without going through international intermediaries.

A prime example of this capacity is the landmark project titled *"Mitigating Greenhouse Gas Emissions through Modern, Efficient and Climate-Friendly Clean Cooking Solutions (CCS)"* with a total budget of USD 49.1 million. This five-year program is actively deploying 500,000 electric cookstoves, 490,000 Tier 3+ improved cookstoves, and 10,000 domestic biogas plants across 150 local levels in 22 climate-vulnerable districts. By directly benefiting approximately one million rural households, this GCF-funded initiative drastically reduces reliance on traditional fuelwoods, improves public health, and empowers rural women.

Monetizing Mitigation: Clean Development Mechanism

AEPC's carbon finance portfolio spans both compliance frameworks and evolving voluntary carbon markets. Through the Clean Development Mechanism (CDM) and Gold Standard (GS) registries, the Centre's decentralized networks of biogas plants, micro-hydro systems, and improved cookstoves have achieved a cumulative reduction of 6.80 million tons of CO_2 equivalent, generating over 36.000 million USD in net carbon earnings to date.

- Looking toward the future, the Centre has successfully registered the 'Ecozone Improved Cooking Stoves Project in Nepal' under the prestigious VERRA registry in six municipalities in the Karnali and Sudurpaschim provinces of Nepal, locking in an anticipated annual emission reduction of 44,000 tons of CO_2 equivalent. Furthermore, AEPC is actively positioning Nepal to leverage market opportunities under the Paris Agreement by transitioning its legacy CDM projects into the Article 6.4 Mechanism and piloting utility-scale biogas operations under Article 6.2 to facilitate Internationally Transferred Mitigation Outcomes (ITMOs). Unlike the centralized UN market, Article 6.2 allows two countries to strike direct, flexible bilateral trade deals for climate mitigation

6. Legislative Horizons: The Renewable Energy and Energy Efficiency Bill

To cement these operational successes into a robust, long-term institutional and legal framework, the Government of Nepal has initiated a comprehensive overhaul of its energy sector governance through the Renewable Energy and Energy Efficiency (REEE) Bill. Drafted under the close technical guidance of the Ministry of Energy and Water Resources and Irrigation (MoEWRI), this draft statute marks a critical policy milestone for alternative energy in the federal era.

Operational Highlights of the Proposed Act

The Bill officially transforms the Centre from an agency operating under a provisional executive Formation Order into a powerful, permanent statutory organization backed by explicit legislative authorities.

While AEPC was originally designated as the national focal point for the promotion of Renewable Energy later got Energy Efficiency via a 2018 amendment, the new Bill now provides clear legal mandates to enforce standardized energy audits, mandate industrial compliance upgrades, and implement standardized labeling frameworks for electrical appliances across commercial sectors.

The Act embeds the Central Renewable Energy Fund (CREF) as the anchor financial mechanism for green infrastructure, providing clear legal protections for public-private viability gap funding (VGF) and commercial risk-sharing facilities.

Status of REEE Bill

Besides AEPC's continuous efforts to bring its own act, after twenty-plus years, the last Bill has successfully cleared its preliminary hurdles, received formal cabinet approval, and is being registered with the House of Representatives for its approval process. For all the stakeholders of the renewable energy sector of Nepal, this will be the final countdown to success. This step will provide the long-term regulatory stability required to support Nepal's clean energy transition.

7. Strategic Trajectories: Integrating Decentralized Assets into the Federal Era

To protect the massive infrastructural progress achieved over three decades, Nepal's renewable energy landscape must transition from a model of isolated operation to one of complete systemic integration and smart grid coexistence.

The long-term value of these distributed energy investments can be sustained through three target initiatives:

Institutionalizing Grid Interconnection Frameworks

The structural isolation of mini-grids must be replaced by systematic grid interconnection. By establishing regulatory guidelines and standardized energy purchase agreements (PPAs), decentralized micro-hydropower plants and solar mini-grids can be converted into independent energy producers that feed electricity directly into the NEA grid. This mechanism ensures that when the national grid arrives, the community asset continues to generate revenue by selling surplus clean energy to the national pool, while securing a highly reliable backup source for local communities.

Strategic Last Mile Electrification Planning

Under Nepal's federal structure, the center is actively collaborating with provincial and local governments to institutionalize the Last Mile Electrification Plan (LMEP) and develop their own Municipal Energy Plans (MEPs). MEPs will strategize their demand and energy resources for optimal use, and the LMEP allows local authorities to systematically map out exactly where the national grid is projected to expand versus where distributed renewable energy (DRE) systems hold a definitive cost advantage. These initiatives prevent redundant infrastructure spending, guide private investments to high-priority zones, and ensure long-term operational viability for local decentralized energy systems.

Deploying Blended Climate and Carbon Finance Mechanisms

Ensuring the longevity of renewable systems requires moving beyond traditional grant reliance toward sustainable financing models. Through the Sustainable Energy Challenge Fund (SECF) housed within the Central Renewable Energy Fund (CREF), AEPC mobilizes blended financing, including Viability Gap Funding (VGF), credit guarantees, and interest rate buydowns. Supported by international partners like the GCF, these frameworks reduce investment risks for private entities and local commercial banks. This capital stability allows community systems to finance modern upgrades, transition toward commercial sustainability, and contribute to the country's broader clean energy goals.

8. Conclusions

The evolution of the Alternative Energy Promotion Centre from a localized credit-and-subsidy channel into an international climate and carbon finance hub underscores its role in Nepal's development history. Over three decades, the Centre's off-grid initiatives have delivered baseline electrification and modern cooking alternatives to millions of citizens across highly complex, remote topographies. Because the national energy grid is expanding, remote communities no longer need to rely entirely on isolated, local energy sources. The long-term durability of these extensive renewable energy investments depends on the effective execution of last-mile alignment strategies, regulatory frameworks for national grid interconnection, and blended finance models. Supported by the upcoming operational powers of the Renewable Energy and Energy Efficiency Bill and sustained access to international financial mechanisms like the Green Climate Fund, AEPC is well-positioned to manage this integration. By linking decentralized innovation with centralized systems, the Centre will continue to safeguard national energy security, protect rural community investments, and advance and support Nepal toward its net-zero target for 2045.

"By linking decentralized innovation with centralized systems, the Centre will continue to safeguard national energy security."

AEPC IN NUMBERS · FROM THIS ARTICLE

3.6 million+
households reached with decentralized clean energy

85,000 kW+
decentralized clean energy capacity

2.20 million+
households with modern, smoke-free cooking

6.80 million t
CO_2e reduced through CDM and Gold Standard

USD 36 million+
net carbon earnings to date

Is Energy Security Possible in Nepal?



Prof. Shaligram Pokharel

Professor, Qatar University, Doha, Qatar

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"We cannot go against nature while investing in energy development ... we have to work with nature, the climate, and our geography."

The views are personal and have no relation with the university that the author is working in.

The rationality of modern energy to support not only economic goods but also to promote social conditions is further squeezing supply situations across the world. The search for efficient and effective energy, based on locally or internationally available resources, has been the focus since the early 18th century. Energy is a global phenomenon for every country in the world, and it is a national asset that is acquired, stored, and utilized. However, the scale of global unmet energy demand is striking: more than half a billion people do not have access to electricity, and almost one-fourth of the world population lives on traditional means like fuelwood, crop waste, charcoal, or coal to meet their needs, resulting mostly in health issues. In this era of sensing mobility, we are still dwelling on the policies to support accessibility, affordability, availability, utilizability, reliability, and sustainability. In addition, we are also focused on economic returns from energy sources, discarding the notion of having a future-proof commercial energy generation/exploration.

Nepal's case is not different from the paragraph mentioned above. It prided itself on being the pioneer for hydropower development in the region, but forgot about its continuity, though the pioneering establishment is still intact in terms of possible resource utilization, whereas the newer developments later, be it from the private or the public sectors, have faced multiple nature-related disasters. Nepal has faced rainfall and glacial lake floods for centuries and has been experiencing different kinds of rainfall patterns and climatic patterns over the decades. However, such memories have been short-lived in policymaking and development. This raises the question of resilience in energy sector development. The recent floods (2026) in Bhote Koshi and Budhi Gandaki, and flash floods in earlier years, are a testimony that we cannot go against nature while investing in energy development (mainly hydropower); we have to work with nature, the climate, and our geography. Note that Nepal's geography is also prone to earthquakes. These situations are not faced by Nepal only; they are faced in Brazil, due to changing rainfall patterns, and in Norway, and a few years ago, in India due to ice melt. There are also examples where a country has committed to exports; with its decreased electricity generation, it has to either keep its people in the dark or import electricity from another country.

Nepal runs into multiple problems: the cost of electricity generation, which is increasing every year as per international data; the location of electricity generation, which is moving to the northern side; the increased pace of snow melting and declining rate of water retention in glacial lakes; increased temperature causing glacial floods; instability of the soil in the hills causing landslides across the river flows; and probably inadequate design constraints addressed in the currently developed hydropower stations, a large focus on the run-of-the-river type of projects with large differentials on generation during the dry and wet seasons, the government contract to promote such generation, and finally low awareness, diversification, promotional initiatives on the other forms of electricity generation, and finally, spatially distributed population that requires a large sum to distribute electricity or other energy sources. Looking at these situations, nationally determined commitments for sustainability seem to be floating to some extent, as the determinations have not been realized to a large extent since the commitment year started. A concerted and holistic effort would be needed.

The pessimistic view presented so far shows that when there is a depression state, the next state is to move out of it. But dedicated motivation is an important part of coming out of a depressed state. The current state of world development is not inward-looking but outward-looking and more global. If we believe in electricity development as a leverage to develop our economy, the country has to invest consistently and heavily in technologically sound and geologically resilient hydropower. Columbia River Basin in Canada is an example, where multiple cascaded and resilient hydropower development projects were initiated to control floods and to generate electricity, with the involvement of the community and the local government. The system has been resilient since 1964, when the concerted approach was instrumentalized in the basin. The nature of river flow is similar in Nepal, but the nature of technological and administrative aspects of materializing such a concerted effort may not be mature enough. However, energy security in Nepal seems possible if some policy instruments are rethought. This is not to say that Nepal has not made any effort on this. There are attempts that have been initiated in the past in the right direction to achieve energy security.

1. Promoting the private sector through the Electricity Act and Hydropower Policy in the Nineties is still the foundation of many initiatives that are used to promote electricity development.
2. The development of inter-country transmission grids between Nepal and India to increase electricity exchanges to meet electricity development through Nepal's own efforts, through bilateral support, loans, and currently through the MCA.
3. The recent commitment to promote private sector involvement in energy trading between Nepal and a third country for captive generation and wheeling.
4. The continued support from NEA to purchase electricity from the private sector and, at the same time, increase its technical, investment, and generation capabilities through NEA-owned projects.
5. Bringing the Hydrology Department under the umbrella of the Ministry of Energy, Water Resources and Irrigation (MoEWRI) is a good move; it will support the ministry with data and knowledge on hydrology.

6. Bringing the Alternative Energy Promotion Centre under the umbrella of MoEWRI is a good move, as the motto of the Center was to implement the promotional policies on renewable energy, which are in the domain of the MoEWRI.
7. The continued electricity trade negotiations between India and Nepal for providing electricity security in Nepal.
8. Developing the transmission pipelines between India and Nepal to import petroleum fuels, probably from multiple points in the future.
9. Promoting solar PV-based electricity generation by NEA and through bidding with the private sector.
10. The move to relinquish two secretaries from the MoEWRI, as the dichotomy in authority and policy development creates friction in policy.

The above efforts have led to some degree of energy supply sustainability. The large-scale attempt at sustainability and energy security may require some instrumental changes.

1. The current motto of the National Planning Commission might have to be changed to a Singapore-style or Ireland-style Economic Development Board, where the Prime Minister acts as the CEO of the organization and it looks after the investments, policy instruments, and policy perks that promote investments in the economic sector, energy being one of the major ones.
2. Remove the focus of the current NEA from total generation, transmission, and distribution; this has been on the anvil for many years but never happened. Ontario Hydro (in Canada) can be an example to see the pros and cons of such a move. This will increase efficiency, generate trade, improve technological capability for generation and transmission, and promote a buyer's market for electricity consumption. The government's role in controlling the price could be reduced.
3. Reconstitute the current AEPC, probably creating an inter-ministerial liaison with the Ministry of Science and Technology, not only to promote, but to initiate research and development of alternative energy in Nepal. This will help sandbox technology enhancements and promote energy efficiency. It can work with international agencies and universities in Nepal to support the sandboxing of energy technology. AEPC experts may know about the energy ladder more than those in other ministries. Sandboxing can not only help to minimize external interruptions but also promote scaling up of small technologies, efficiency improvements, and promote local-level sustainability in terms of resource use.
4. Re-ignite the policy debate by learning the best practices: In earlier days of establishing the Water and Energy Commission Secretariat (WECS), it was a vital organ for policy development in the water and energy sector. This was modeled as a central authority for water and electricity-related policies, like the Central Water and Power Commission of India (established around 1951). The commission used to be a focal point for enriched discussions and support to the ministry for policy formulation. This vital organ in the government was later made a dumping ground for government staff with a meagre budget and minimal role in policy development. WECS focused on a large-scale study on small hydropower development, irrigation, biogas, and solar, and was solidly represented in the bilateral, trilateral, and multilateral discussions related to the water and energy sector. It has also conducted multiple river basin studies and implemented some energy projects to study the effects of policy at the ground level. WECS was heavily involved in a study for water resources strategy development and policy formulation. If led correctly, this organization has the potential to match any research agency in the region. To this day, it is the main source of the energy database in the country. Therefore, the role of this agency has to be increased not by increasing the staff but by having effective people working in the water and energy sectors.
5. MoEWRI should establish the delineation of projects (solar or hydropower, for now) for energy exchange, national consumption, and local consumption. Discussion to change hydropower policy to this effect was carried on in the late Nineties and the early 2000s; however, this could not collect steam further, thus the running policy dragged the development of the energy sector to the current state. The connectivity of small-scale ROR projects does not benefit the national distribution system, although they could be ok to enhance the electricity supply in the local area, and the provision of larger-scale electricity generation can become a waste when it is destined to be used for local consumption without much support from the transmission and distribution infrastructure. The current substations in many parts have very low capacity and low reliability in electricity supply.
6. Leave solar energy development to scale up and sustain itself. The market works better could be the best example to support solar PV upscaling. There are a few current problems now: envisaged land hoarding (or grabbing), cost of land to install a solar system, and the connection point from the nearest electricity substation to the solar station, non-utilization of non-cultivated land for solar, unproductive utilization (only for solar) of the land area, changes in technology import or technology capability, and pricing problems. In principle, these are solvable through a welcoming policy dialogue. Nepal's solar PV installers are in a much better knowledge position now than they were five years ago and have produced electricity at a much lower cost than that done by NEA for solar systems. There are land areas, non-cultivated agricultural land, which the government can purchase and provide on lease or encourage landowners to provide lease through policy concessions (like rebate in land tax), mandating multiple use of solar installed area for agricultural activities, and mandating the Electricity Regulatory Commission as a free body (in the like of Central Electricity Regulatory Commission of India) to provide policy options for the electricity generation. Promoting private sector solar PV installations and bidding for it under the policy of the Indian Commission has helped to soar electricity installations in India, leading to more than 40 GW of solar capacity in India in the last year alone.

Will these efforts bring energy security in Nepal?

The question cannot be answered now, as energy security is a long-term shifting goal. As demand and supply change, the security threshold will also change, but the current instruments may not contribute to it. Energy security is multi-dimensional: human resources, resource/geology and import/export possibilities, finances, economic state of the people and the country, penetration of energy technologies (generation to use), and finally sustainability and dispersed location of the population. What drives them together? Policies and institutional structure: at this point, these two are the roots.



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"The success of this next phase will depend less on legislation than on people."

Role of AEPC in Energy Efficiency Promotion, Human Resource Development and Way Forward for Green Economic Transition in Nepal

1. Introduction

Energy is now recognised as a major factor of production, alongside labour and capital, and its productive use drives national economic output. For Nepal, the question is no longer only how much energy is generated but how efficiently it is used. The country has an economically viable hydropower potential of about 42 GW and a target of 28,500 MW of installed capacity by 2035. Yet its industries, buildings and transport still waste a large share of the energy they consume, and much of the economy still depends on imported fossil fuels and traditional biomass.

Energy efficiency is the cheapest and quickest response. A unit of energy saved does not need to be generated, transmitted or imported. It lowers costs for households and industry, defers investment in new supply and frees surplus electricity for domestic electrification and export. Globally, efficiency is expected to deliver about 40% of the CO_2 abatement needed by 2050 to stay below 2°C.

AEPC completes 30 years on 3 November 2026 (Kartik 18, 2083 B.S.), just as the Renewable Energy and Energy Efficiency Bill, 2026 has been registered in the Federal Parliament. If passed, it will make energy audits mandatory, require designated consumers to appoint energy managers and license energy auditors, turning energy efficiency from a voluntary programme into a regulated, professional field. That can only work if trained people are available to carry it out. This article reviews AEPC's role in energy efficiency, examines how academic collaboration, particularly with the Center for Energy Studies (CES), IOE, TU, can build the human resources Nepal needs, and sets out a way forward for the green economic transition.

2. AEPC: Background and Mandate for Energy Efficiency

The Government of Nepal established AEPC on 3 November 1996 (Kartik 18, 2053 B.S.) under the then Ministry of Science and Technology; it now works under the Ministry of Energy, Water Resources and Irrigation (MoEWRI). For its first two decades AEPC was known mainly for rural energy access: micro and mini hydropower, solar home systems, biogas, improved cookstoves and, later, mini-grids and productive end uses. Its delivery model of subsidy policy, technical standards, quality assurance, private sector networks and local government partnership, financed through the Central Renewable Energy Fund (CREF), now forms the base of its energy efficiency work.

Energy efficiency work in Nepal is older than AEPC, but it was long project-based and scattered: from UNESCAP/UNIDO audit training (1985–86) and the Office of Energy Efficiency Services supported by the World Bank (1994–98), to DANIDA's support for cleaner production in 360 industries (2000–05), the Nepal Energy Efficiency Programme with GIZ (2010–21) and its successor REEEP (2021–present). Today AEPC is the government body mandated for both renewable energy and energy efficiency. Its efficiency mandate covers five areas:

- **Policy and regulation:** the legal framework, including the new bill and its rules and directives.
- **Standards and labelling:** minimum energy performance standards and labels, with the national standards body.
- **Energy audits and demonstration:** audits and energy management plans in industries, hospitals, hotels and public buildings.
- **Market development and finance:** working with banks, suppliers and energy service providers.
- **Awareness and capacity building:** with academia, industry associations and provincial and local governments.

AEPC's main limitation has been its legal status. As a body created by a formation order, it has lacked the authority to enforce efficiency requirements or to coordinate formally with provincial and local governments. The 2026 bill is designed to remove this constraint.

3. National Energy Efficiency Strategy 2018

Approved by the Cabinet on 19 November 2018, the National Energy Efficiency Strategy (NEES), 2075 was Nepal's first policy document devoted entirely to energy efficiency. It aims to double the average annual rate of efficiency improvement from 0.84% (2000–2015) to 1.68% by 2030, in line with SDG target 7.3. The baseline was stark: in FY 2073/74 only about 22% of energy came from modern sources, per capita electricity use was about 190 kWh a year, and energy intensity, at 1.19 toe per US$1,000 of GDP, was almost double the South Asian average.

Its instruments include a national energy efficiency entity (a role AEPC has taken up), standards and labelling with MEPS, regular audits backed by auditor accreditation, sectoral programmes, investment of about US$670 million a year by 2030, and skilled human resources and applied research through partnerships with academia. NEES recognised from the start that standards and audits would remain on paper without trained professionals. Eight years on, most of its instruments still lack a binding legal basis; that is the gap the new bill seeks to close.

4. The Renewable Energy and Energy Efficiency Bill

Registered in the House of Representatives in early October 2026 by Energy, Water Resources and Irrigation Minister Biraj Bhakta Shrestha, the bill would give Nepal its first act covering renewable energy and energy efficiency together. For AEPC it is an institutional milestone: the Centre would become an autonomous Renewable Energy and Energy Efficiency Centre, taking over AEPC's assets, staff and fund, with CREF widened into a Sustainable Energy Fund and 14 core mandates, from policy advice to all three tiers of government to energy audits, appliance standards and carbon projects. Its efficiency provisions turn NEES into enforceable obligations:

- **Seven designated sectors,** from industry, transport and buildings to service institutions, agriculture and water, energy-using equipment and the power sector.
- **Designated consumers** must keep monthly energy records, set annual efficiency targets and plan the replacement of energy-intensive machines.
- **Mandatory audits** by a recognised auditor within three years of starting operation and every three years after, with recommendations acted on.
- **Energy managers** in industries and commercial establishments above the consumption threshold.
- **Licensed energy auditors:** a bachelor's in engineering or energy, two years' experience and Centre-approved training for a five-year licence.
- **Testing and penalties:** a national testing laboratory, bans on equipment that fails standards, and fines of up to Rs 500,000, Rs 1 million and Rs 2 million.
- **All three tiers of government** run efficiency and conservation programmes.

These provisions create, for the first time, a legal demand for two professions: the energy auditor and the energy manager. Universities and training institutions must be ready before the act comes into force, not after.

5. Standardisation and Certification

Every appliance, motor and pump bought today will shape national demand for 10 to 20 years. Nepal imports most of its equipment, so without minimum standards it becomes an outlet for inefficient products that neighbours have phased out. AEPC has completed studies towards draft standards for 12 product groups, from fans, refrigerators and air conditioners to motors, pumps and microwave ovens, and is benchmarking energy use in steel, cement, paper, dairy and star-rated hotels for sectoral MEPS. Adoption still depends on the Nepal Bureau of Standards and Metrology and on the bill's testing and enforcement powers.

Certification is needed at three levels: products, organisations and professionals. The third is the most urgent, because a laboratory or label is only as credible as the people who measure and audit. India's Bureau of Energy Efficiency, which accredits auditors under its Energy Conservation Act, 2001, offers a model Nepal can adapt.

6. Mandatory Audits: Energy Auditors and Energy Managers

Nepal's audit experience goes back to the 1990s, when audits in 30 units yielded about NRs 10 million in savings. Recent AEPC audits in industries, hospitals and hotels still find low-cost savings in motors and pumps, compressed air, boilers and steam, power factor, lighting and operating practice. Until now these audits have been voluntary and donor-supported; the bill would make them a recurring legal duty. That needs two distinct professionals:

Energy auditor

Works for: an independent audit firm or as a licensed individual

Main task: measure, analyse and report savings opportunities, and verify results

Core skills: instrumentation, thermal and electrical systems, data analysis, techno-economic evaluation

Under the bill: bachelor's in engineering or energy, two years' experience, Centre-approved training, five-year licence

Energy manager

Works for: the designated establishment itself

Main task: implement audit recommendations, track monthly consumption, meet annual targets and report to the Centre

Core skills: energy management systems, monitoring and targeting, operations, procurement, financing

Under the bill: required above a consumption threshold; qualification to be set in the rules

Even a conservative threshold would cover large industries, hospitals, hotels, commercial complexes, government buildings, water utilities and the power utility. Yet supply is thin: engineering students are only 5.29% of higher-education enrolment and women 24.4% of them, while Karnali and Sudurpaschim together host less than 11% of campuses. A national assessment of demand, by sector and province, should be a first joint task of AEPC and academia.

7. Role of CES, IOE, TU in Human Resource Development

Established by Tribhuvan University on 21 January 1999, CES is the energy centre of the Institute of Engineering and AEPC's natural academic partner; TU accounts for 77.61% of higher-education enrolment, so what CES builds can scale nationally. Energy auditing is taught within IOE's BE programmes, and CES runs MSc programmes in Energy Systems Planning and Management, Renewable Energy Engineering, Energy Efficient Building, and Technology and Innovation Management, whose graduates serve in AEPC, NEA, ministries, provinces and industry.

CES has organised more than 42 training programmes, 50 research and policy studies, 73 awareness programmes and 40 workshops. With GIZ and Erasmus+ support it set up the National Energy Efficiency Training and Demonstration Laboratory at Pulchowk Campus. With AEPC it can build a national ladder to licensed professionals: efficiency courses in every BE discipline, specialised MSc and certificate programmes, a standard curriculum for auditors and managers taught in all provinces, an independent licensing examination and continuing professional development, with CTEVT training technicians.

8. Way Forward for Green Economic Transition

Nepal has committed to net-zero emissions by 2045. A green transition means using clean domestic electricity efficiently to replace imported fuels, raise productivity and create jobs. The priorities are to:

- **Enact and implement the act,** with rules, thresholds and a phased timetable, and a properly resourced Centre.
- **Update NEES** and prepare a National Energy Efficiency Action Plan linked to the NDC and net-zero goal.
- **Adopt standards and labels** for motors, pumps, fans, refrigerators, air conditioners and lighting.
- **Make efficiency the partner of electrification** in cooking, mobility and industry.
- **Build the workforce before the law bites,** in all seven provinces and with more women.
- **Institutionalise an AEPC–CES partnership** for curricula, research, internships and audit data.
- **Finance efficiency as an investment** through credit lines, guarantees and ESCO contracts.

9. Conclusion

In 30 years AEPC has brought clean energy to millions of rural households and become Nepal's focal agency for energy efficiency. NEES 2018 set the direction; the 2026 bill offers the legal authority it lacked. Success will now depend less on legislation than on people: competent auditors, energy managers, planners and researchers in every province. CES is ready to work with AEPC to build that workforce, and on its 30th anniversary AEPC is well placed to lead the transition.

> *Every kilowatt-hour saved at home is also a kilowatt-hour available for industry or export.*
>
> DR. SHREE RAJ SHAKYA



Dr. Prakash Aryal

Hydrogen expert, Australia; former AEPC staff

From Hydropower to Green Molecules: Building Nepal's Hydrogen Economy

A strategic opportunity for energy security, industrialisation, food security and a new generation of green investment

For decades, Nepal's renewable-energy story has rightly centred on hydropower, micro-hydro, solar energy, biogas, improved cooking technologies and, increasingly, distributed and hybrid energy systems. The Alternative Energy Promotion Centre (AEPC) has been an important part of that transition (AEPC, 2026). The next chapter can be more ambitious. Nepal should think not only about how much renewable electricity it can generate, consume or export, but also about what high-value products it can manufacture from that electricity at home. Green hydrogen offers such an opportunity.

Nepal adopted a national Green Hydrogen Policy in 2024 that recognises renewable hydrogen as a pathway to carbon neutrality, energy security, industrial development and reduced reliance on imported petroleum, including producing hydrogen and its derivatives from hydropower (MoEWRI, 2024). The challenge now is to move from policy to regulation, from regulation to demonstration, from demonstration to bankable projects, and eventually to a homegrown industry. Green hydrogen can become ***an industrial platform connecting hydropower, transport, agriculture, fertiliser, manufacturing and eventually sustainable fuels.***

What is hydrogen?

Hydrogen is the lightest chemical element and an important industrial molecule. It is not available as a free fuel and must be separated from compounds such as water or hydrocarbons, so it is better understood as an energy carrier and chemical feedstock than as a primary energy resource. Its environmental impact depends on how it is produced, and the industry uses colours as shorthand:

- **Grey:** from fossil fuels, usually natural gas, without capturing the carbon dioxide.
- **Blue:** from fossil fuels, with carbon capture applied to part of the emissions.
- **Brown or black:** from coal. **Pink:** from nuclear electricity.
- **Green:** from renewable electricity splitting water through electrolysis.

For Nepal, the strategic pathway is green hydrogen made from hydropower in a device called an electrolyser:

Water + renewable electricity → green hydrogen + oxygen (by-product)

Using domestic electricity, Nepal would not need to import the primary energy source. Instead of continuously buying fossil-energy molecules produced elsewhere, it could manufacture a clean energy carrier at home from renewable electricity and water.

Why green hydrogen, and why Nepal?

Nepal combines significant hydropower potential, wet-season surplus generation, other renewable potential and abundant mountain water. Its electricity system is also strongly seasonal: a 2026 Tribhuvan University study describes wet-season surpluses alongside dry-season imports. This mismatch is an industrial opportunity as well as a power-system challenge. An electrolyser can become a new controllable electricity consumer, turning surplus power into hydrogen for transport, fertiliser and selected industries.

The national policy itself cites abundant hydropower, seasonal generation, lower petroleum use, fertiliser production and sustainable industrialisation as reasons to develop green hydrogen, and the Global Green Growth Institute (GGGI) has since prepared a Green Hydrogen Roadmap for Nepal. The strategic question is no longer simply whether hydrogen is technically possible, but:

> *Where can hydrogen create the greatest economic, energy-security and industrial value for Nepal, and what must government do now to make those applications investable and safe?*

Where could Nepal use green hydrogen?

a. Transport: start where batteries have limitations

Battery electric vehicles should remain the main pathway for passenger mobility. Hydrogen should be targeted at heavy-duty, high-utilisation and long-distance uses: fuel-cell demonstrations, freight trucks, buses and commercial fleets, specialised heavy vehicles, and hydrogen-derived fuels such as SAF and renewable diesel. A credible start is a **hydrogen transport corridor or captive fleet demonstration**, where production, refuelling and vehicles are concentrated. Deployment must not precede safety regulation; standards such as ISO 19880-1 for refuelling stations give Nepal a foundation to build on.

b. Green ammonia and fertiliser: Nepal's strongest early opportunity

Hydrogen's most compelling near-term use in Nepal may be agriculture. Combined with nitrogen, hydrogen produces ammonia, the building block of nitrogen fertilisers:

"Safety cannot be appended after the industry develops. It must be designed into the industry from day one."

Hydropower → electrolysis → green hydrogen → green ammonia → green fertiliser (urea, DAP etc.)

Nepal imports all its fertiliser, and GGGI studies in 2025 and earlier identify green ammonia as a way to use surplus hydropower and replace those imports. A domestic green-fertiliser industry could:

A green-fertiliser industry could

- create demand for renewable electricity
- substitute an imported strategic commodity
- support food security
- build chemical-process capability
- create industrial jobs
- build engineering and O&M skills
- anchor Nepal's hydrogen ecosystem

c. Industrial heat

Electric boilers, heat pumps and direct heating should come first. Hydrogen may serve high-temperature processes that are hard to electrify: metal processing, kilns and furnaces, glass and ceramics, and future low-carbon materials processing.

d. Gateway to sustainable fuels

Green hydrogen can also be a building block for green methanol, sustainable aviation fuels and other synthetic liquid fuels, which matter for a landlocked, tourism-dependent country. These value chains need large amounts of electricity, carbon feedstock and capital, so they are a medium- to long-term opportunity, to follow once production, certification, regulatory and safety capabilities are in place.

e. Cooking: possible, but it must earn its place

Hydrogen could in principle displace some imported LPG, but household use of compressed hydrogen carries real safety risks. Where reliable electricity exists, electric cooking is more efficient because it avoids converting electricity to hydrogen and back to heat. Hydrogen may suit selected commercial, institutional or remote uses, complementing rather than competing with electrification.

An opportunity larger than hydrogen production

The bigger prize is the domestic value chain around hydrogen. It needs electrical, chemical, mechanical, control and safety engineers; electrolysers and balance-of-plant; water treatment, compressors, pressure vessels, pipelines and storage; ammonia synthesis; refuelling infrastructure; laboratories and certification bodies; operators and technicians; researchers, developers, insurers and project-finance specialists. Hydrogen policy can therefore also be industrial, skills and employment policy, with a long-term goal of localising engineering, fabrication, operations and, eventually, selected equipment manufacture.

Finance must see hydrogen as infrastructure

For banks and investors, early hydrogen projects carry unfamiliar technology, market and capital risks over long asset lives. Government policy must make them bankable. Lenders need confidence in:

What a lender needs confidence in

- long-term renewable supply
- electricity pricing
- land and water access
- technology performance
- environmental approvals
- safety regulation
- long-term offtake
- creditworthy buyers
- insurance and emergency response
- predictable taxation
- foreign-exchange exposure
- certified renewable origin
- enforceable contracts

Challenges

- **Cost:** electrolysers, compression, storage and conversion plants need significant capital; economics depend on electricity price, utilisation and financing.
- **Seasonal supply:** low plant utilisation raises the unit cost of hydrogen even when electricity is cheap, so hydropower, grid and hydrogen planning must be integrated.
- **Infrastructure:** production, storage, transport, refuelling and use will have to develop together.
- **Water:** national abundance does not remove local constraints; projects need source assessment, treatment and discharge management.
- **Skills:** engineers, regulators, technicians, insurers and emergency responders will need hydrogen competencies.
- **Markets:** early projects need credible offtakers, which favours anchored markets such as fertiliser and captive fleets.

AEPC's immediate role: standards, regulation and safety

Hydrogen is a small, highly diffusive molecule with a wide flammability range, and plants involve high pressure, oxygen, compressors and, downstream, ammonia. Deployment must not run ahead of regulation. The 2024 policy calls for guidelines on safety, environmental sustainability and quality; the next step is a National Hydrogen Code, Standards and Safety Framework covering the whole lifecycle:

Production → compression → storage → transport → dispensing → industrial use → emergency response → decommissioning

Nepal can review and adapt ISO/TC 197, ISO 19880-1, IEC and other recognised standards to its legal and geographic context. The framework should cover:

A national hydrogen safety framework should cover

- electrolyser and production safety
- hazardous-area classification
- pressure systems and cylinders
- storage and separation distances
- pipelines and transport
- hydrogen purity and quality
- refuelling infrastructure
- explosion and fire protection
- ventilation and gas detection
- emergency isolation and shutdown
- ammonia storage and handling
- emergency response
- occupational health and safety
- operator competency
- inspection and certification
- incident reporting

Safety must be designed into the industry from day one, and AEPC is well placed to coordinate this element of Nepal's hydrogen ecosystem.

A proposed way forward for Nepal

- **Stage 1, rules and guidelines:** a Green Hydrogen Act or regulatory framework, standards, permitting, safety codes and clear institutional roles, so investors know who licenses, certifies and approves.
- **Stage 2, a national hydrogen programme:** AEPC as a catalyst linking ministries, NEA, WECS, the Department of Industry, NBSM, universities, developers, banks, insurers and development partners.
- **Stage 3, link to hydropower planning:** show developers where electricity for electrolysis is available, at what tariff and with what grid constraints.
- **Stage 4, two or three flagship projects:** hydropower to green ammonia and fertiliser; to a captive heavy-transport fleet; or to industrial heat, each after rigorous feasibility, safety and commercial assessment.
- **Stage 5, financing:** concessional and blended finance, guarantees, fiscal incentives, demonstration grants, green bonds, climate finance and PPPs, to overcome early barriers rather than to subsidise permanently.
- **Stage 6, Nepalese capability:** build on Kathmandu University's Green Hydrogen Laboratory with programmes in engineering, operations, process safety, inspection, certification and project finance.
- **Stage 7, industrial localisation:** piping, structures, balance-of-plant, controls integration, water treatment and maintenance offer early openings for domestic industry.

A new avenue for AEPC

The organisation that helped Nepal mainstream decentralised renewables can now help it enter the era of green molecules and green industry. AEPC's portfolio can expand beyond solar, micro-hydro, biogas and hybrid systems towards storage, green hydrogen, green ammonia, green fertiliser, sustainable fuels and industrial decarbonisation, extending its historic mandate rather than abandoning it.

Conclusion: turn Nepal's water into green industrial prosperity

The Green Hydrogen Policy 2024 has opened the door, and a growing body of roadmap and technical work supports the next stage: implementation. Nepal should not pursue hydrogen because it is fashionable, nor attempt every application at once. It should begin where it has genuine advantages: renewable hydropower, water, seasonal surpluses and heavy dependence on imported fuels and fertilisers.

The priorities are clear: regulate it, standardise it, make it safe, demonstrate it, finance it, develop the workforce, and progressively industrialise it. For policymakers, hydrogen connects energy with industrial and agricultural policy; for banks, it can become a new infrastructure asset class; for young Nepalese professionals, it opens new fields of skilled work; and for AEPC, it is an opportunity to help lead Nepal's next energy transition.

> *"Regulate it, standardise it, make it safe, demonstrate it, finance it, develop the workforce, and progressively industrialise it.*
>
> DR. PRAKASH ARYAL



Kushal Gurung

President, Renewable Energy Confederation of Nepal (RECON)

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"The private sector stands ready to pilot, invest and scale."

Beyond Energy Access

Strengthening the AEPC–Private Sector Partnership for a Sustainable and Resilient Nepal

From Energy Access to Sustainable Energy Services

Over three decades, Nepal has made remarkable progress in expanding clean energy access, particularly in rural and remote communities. The Alternative Energy Promotion Centre (AEPC) has been central to this, deploying renewable technologies, mobilising public and development finance, and building the institutions to meet access challenges. The benefits reach beyond electricity to health, education and livelihoods.

Nepal's energy transition is now entering a new phase. The challenge is no longer simply to provide infrastructure, but to ensure that energy services are reliable, affordable, financially sustainable and responsive to evolving needs. Public investment remains essential, particularly in underserved areas, but cannot alone meet the scale of demand. Private investment, entrepreneurship, innovation and operational expertise will be equally important, making the AEPC-Private Sector partnership central to universal access to clean, affordable and sustainable energy.

AEPC as an Enabler of Private-Sector Participation

Private enterprises have long been integral to Nepal's renewable energy development as suppliers, contractors, consultants, operators and investors. AEPC's programmes have helped create markets, build technical capacity, set quality standards and grow domestic enterprises.

The lesson is that public institutions and private enterprises are complementary, not competing. AEPC provides policy direction, coordination, technical support, financial facilitation and public-interest safeguards; the private sector brings investment, innovation, technology and the ability to operate systems long-term.

The relationship is also evolving. Private firms are moving beyond supplying and installing equipment towards developing, owning and operating infrastructure, as seen in Renewable Energy Service Companies (RESCOs) and EV charging operators. These models make renewable energy a long-term service rather than a one-time intervention, and allow AEPC to strengthen its role as a market facilitator, directing public resources where they create the greatest value.

The Sustainable Energy Challenge Fund: Catalysing New Business Models

The Sustainable Energy Challenge Fund (SECF) is an important step in this direction. Traditional programmes have focused on subsidising individual technology installations, which expanded access but did not always address long-term operation, financing and commercial sustainability. The SECF can encourage innovative business models and attract private investment.

Under a RESCO model, for example, a company invests in, owns and operates a solar rooftop system while the consumer pays for the electricity service without bearing the upfront cost. Developers can likewise recover investments in mini-grids or EV charging stations through energy sales and service charges.

Success depends on appropriate financing, predictable policies, clear contracts and mechanisms to manage risk. The SECF should therefore be viewed as a platform for market development, not simply a grant facility. Its future design could emphasise scalable models and underserved markets, using viability gap funding, concessional financing, guarantees and performance-based incentives. There is also potential in storage, productive end-use, waste-to-energy and green hydrogen.

Decentralised Energy: Combining Proven Technologies with New Opportunities

Many technologies AEPC has promoted remain highly relevant. Biogas, micro-hydro and improved cookstoves (ICS) continue to deliver essential services where conventional infrastructure struggles to reach, especially in remote mountain communities.

Solar mini-grids, solar rooftop, battery storage and hybrid systems complement these. Under RESCO models, households, schools and health facilities can access clean electricity without full upfront investment, while hybrids combining solar, micro-hydro and storage improve reliability. The private sector can increasingly develop, finance and operate such systems, but technology and business model must match local demand, resources and affordability. A diversified energy mix, backed by suitable institutional and financing mechanisms, is essential for universal access.

The Last-Mile Challenge: Why Public Support Remains Essential

Providing clean, affordable energy in remote areas remains among Nepal's toughest development challenges. Difficult geography raises the cost of transport, technicians and maintenance, often beyond what households and local enterprises can afford. Private companies cannot be expected to absorb the risks of high transport costs, low demand density and uncertain revenues, nor can end users pay the full cost of technologies beyond their means. Universal access therefore requires public institutions to address market barriers while private enterprises deliver efficient, sustainable services.

AEPC's role must extend beyond capital subsidies. It can coordinate with local governments, support project preparation, aggregate demand, and help enterprises overcome regulatory and operational barriers, including through concessional finance and risk-sharing. Private enterprises, for their part, need predictable subsidies, timely payments and simpler approvals, since delays raise costs and deter investment.

The objective is not to replace private investment with public financing, but to use public resources strategically to make socially important energy services commercially and financially viable.

"The objective is not to replace private investment with public financing, but to use public resources strategically."

Climate Resilience and the Strategic Importance of Decentralised Energy

The recent climate-induced floods in the Bhotekoshi-Rasuwa region highlighted Nepal's vulnerability to climate change and the need for resilient infrastructure. Floods and landslides can damage centralised infrastructure and disrupt supply to households, businesses and health facilities.

Decentralised systems, including solar, micro-hydro, biogas, battery storage, hybrids and locally managed infrastructure, can keep providing essential services when larger networks fail. Integrated with the national grid, they improve energy security and support emergency response. Decentralised energy should be recognised as integral to energy security, climate adaptation and disaster preparedness. This is another opportunity for partnership: private firms can develop and operate such systems, while AEPC facilitates finance, climate-resilient design and local coordination.

Strengthening the Partnership for the Next Phase of Nepal's Energy Transition

The submission of the Renewable Energy and Energy Efficiency Bill to Parliament is an opportunity to strengthen the sector's institutional foundation and could give AEPC a stronger legal mandate and expanded responsibilities. This should be accompanied by renewed focus on public–private partnerships. The Ministry of Energy, Water Resources and Irrigation (MoEWRI) should prioritise a diversified energy mix, decentralised systems, storage and climate-resilient infrastructure, with AEPC adequately resourced to lead and the private sector recognised as a strategic partner in policy, programme design and implementation. Key priorities include:

KEY PRIORITIES

1. Strengthening and expanding the SECF to mobilise private investment and support innovative service models.
2. Continuing support for proven decentralised technologies such as biogas, micro-hydro and ICS, including grid connection of micro-hydro plants left idle since the arrival of the national grid.
3. Designing financing for remote and underserved markets, addressing high logistics costs and low demand density.
4. Giving greater attention to RESCOs, solar rooftop, mini-grids, EV charging, storage and productive end use.
5. Strengthening coordination with local governments, financial institutions, technology providers and industry associations to create a predictable investment environment.
6. Institutionalising public-private dialogue in programme development and implementation. Organisations such as RECON can bring enterprises together and help translate policy into commercially viable solutions.

The central challenge is not simply to deploy more renewable technologies, but to build an energy ecosystem that delivers clean, affordable services sustainably to every household, enterprise and community. AEPC has played a defining role over three decades; its next phase should build on that legacy by strengthening public private partnership.

With the right policies, financing, institutional support and entrepreneurial innovation, Nepal can move towards an energy system that is cleaner, more affordable, decentralised, inclusive and resilient. The private sector stands ready to pilot, invest and scale; AEPC's leadership in creating the enabling environment will ensure lasting benefits for all Nepalis.



Amrit Abhamani Dhakal

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Raising the Floor

A Private-Sector View of AEPC's Energy Efficiency Standards and the Road Ahead

Seen from the other side of the table

Most writing about the Alternative Energy Promotion Centre (AEPC) comes from inside government or from its development partners. This article looks from the other side of the table — from the consultants, energy auditors, equipment suppliers and plant engineers who carry AEPC's efficiency programmes into factories, hotels and hospitals, and who will live with the standards it sets. From there, the test of a standard is simple: does it change what happens on the shop floor?

The stakes are high. Nepal's energy use is still dominated by traditional fuels, even as the country generates more hydropower than ever:

58%	39%	3%
Traditional fuels	Commercial energy	Modern renewables

Share of total energy consumption — Economic Survey 2082/83

Every kilowatt-hour lost in an oversized motor, a leaking compressed-air line or an uninsulated steam pipe could have powered an electric cookstove, displaced imported diesel or been exported. Efficiency standards set a floor below which equipment and facilities should not perform, and since 2018 AEPC has been the institution laying that floor.

What the private sector sees on the ground

Those of us who measure, benchmark and try to improve energy performance in Nepali industry meet the same obstacles again and again.

Data that does not exist, or is not shared. Most plants have one revenue meter at the gate and little or no sub-metering. Fuel use is kept in handwritten log books, if at all, and production is recorded in units that differ from plant to plant. Auditors often rebuild a year of energy use from monthly bills and fuel invoices, and owners frequently hesitate to share records for fear of competitors, tax scrutiny or penalties.

Plants that are hard to compare. Product mix, plant age, capacity utilisation, raw-material quality and altitude all move specific energy consumption. Seasons matter too: a dairy runs very differently in the flush and lean seasons, and a hotel follows occupancy and the tourist calendar. Foreign benchmarks rarely fit Nepal's climate, building types or operating patterns.

An unreliable grid behind the numbers. Voltage fluctuation, outages and poor energy quality push industries onto diesel generators and force equipment to run below rated efficiency, so a plant can look inefficient for reasons outside its fence.

Short timelines and thin budgets. Sector assessments often get only a few weeks of fieldwork, and lowest-price procurement limits sample sizes, detailed audits and repeat visits. Energy-quality analysers, flue-gas analysers, ultrasonic flow meters and thermal cameras are costly, and calibration facilities in Nepal are limited.

Audits that stop at the report. Measures with paybacks of one to three years are routinely shelved because capital is committed elsewhere, banks do not treat energy savings as cash flow, or no one in the plant is assigned to act. Energy service companies are almost absent, and few plants employ an energy manager.

A market that rewards the cheapest machine. Imported motors, pumps, fans and appliances of uncertain efficiency sell at low prices. Without mandatory standards and labels, buyers cannot tell efficient products from inefficient ones, and quality suppliers compete on price alone.

Thin professional capacity and unclear roles. There is no statutory certification or accreditation for energy auditors and managers, nor a common audit format, so audit quality varies widely. Responsibilities across industry, standards, testing, customs, utilities and the three tiers of government are not yet tied together in law.

How AEPC responded: an outsider's assessment

It built on a culture industry already knew

AEPC, established on 3 November 1996 (18 Kartik 2053), tied public support to tested quality long before efficiency became its business. The clearest example is the **Nepal Interim Benchmark for Solid Biomass Cookstoves (NIBC, 2016)**, developed with the Renewable Energy Test Station (RETS). It set minimum high-power thermal efficiencies by stove category — from 20 percent upward to 25 and 35 percent for higher categories — together with emission and safety limits. In effect, Nepal already had a minimum energy performance standard for one of its most common appliances.

> *"Industry has been shown its performance, but not yet asked by law to change it."*

The efficiency mandate followed policy. Efficiency studies in Nepal date back to 1985, and the Nepal Energy Efficiency Programme (NEEP, from 2010) and the Renewable Energy and Energy Efficiency Programme (REEEP, from 2021) built the first auditors and industry outreach. The **National Energy Efficiency Strategy, 2075** called for national efficiency standards and set a clear national target:

0.84%	1.68%	Oct 2018
Annual efficiency improvement, 2000–2015	Target annual rate by 2030	AEPC designated national focal agency for energy efficiency

National Energy Efficiency Strategy, 2075

It took ownership of appliance standards

AEPC commissioned draft efficiency standards for twelve categories of equipment:

Household and commercial	Motive energy and water	Thermal and cooling
Electric fans	Induction motors (single- and three-phase)	Refrigerators
Colour televisions	Pump sets (submersible and surface)	Deep freezers
Washing machines		Room air conditioners (unitary and split)
Laptops		Electric geysers
Microwave ovens		Solar water heaters

From industry's view the list is well chosen: motors and pumps dominate demand in industry, irrigation and water supply, while cooling and water heating are the fastest-growing loads in hotels and homes. Almost all these products are imported, so a rule applied at import reaches the whole market.

Electric cooking moved furthest. With the Nepal Bureau of Standards and Metrology (NBSM) and the Clean Cooking Alliance, national standards were developed for induction cookers, hotplates and the safety of household electric cooking appliances, and on **12 February 2025** NBSM approved standards for electric pressure cookers and infrared hobs, including **NS 606:2081** (safety) and **NS 607:2081** (performance). AEPC writes these into its technical specifications — for example, for single-pot induction stoves — so only compliant appliances are distributed through its e-cooking programmes with local governments. That link between a standard and a real purchase order is what makes suppliers take notice.

It moved from appliances to whole sectors

For cement kilns, steel re-rolling mills, paper machines, dairies and large hotels, the relevant standard is a **specific energy consumption (SEC)** benchmark per tonne, per litre or per room-night. AEPC has built towards sectoral standards through:

- baseline energy audits in public and private institutions, industries and commercial buildings;
- energy-manager and energy-auditor training programmes;
- a Sector-wise Action Plan for Implementation of Energy Efficiency in Nepal;
- a rapid assessment of the metal and steel industry (AEPC/EE/RFP/2082/83-02) to determine MEPS; and
- a World Bank-financed rapid assessment of cement, pulp and paper, dairy and star-rated hotels (NP-AEPC-20262701-CS-CQS) to produce comparable SEC benchmarks and sectoral MEPS.



Steel sector processing, from the field

For many plants, this was the first time their energy performance was measured against national peers. The approach — grouping plants by size class, treating electrical and thermal energy separately, proposing tiered thresholds and linking plant benchmarks to equipment specifications — answers several of the field difficulties above.

Where the gaps remain

NBSM issues Nepal Standards and AEPC supplies the evidence, testing links and programmes that give them effect — a sensible division of labour. But without a legal mandate, standards bind only inside subsidised programmes. Most of the twelve appliance drafts remain drafts, there is no mandatory label, and sectoral benchmarks cannot yet require a plant to improve. Industry has been shown its performance, but not yet asked by law to change it.

The new bill: what changes, and what industry will ask

An earlier version of the Renewable Energy and Energy Efficiency Bill passed the National Assembly in 2025, and in October 2026 the **Renewable Energy and Energy Efficiency Bill, 2083** was registered in the Federal Parliament. For efficiency, it supplies the missing legal force:

	Today	Under the bill
Institution	AEPC, operating for three decades under a formation order	Autonomous Renewable Energy and Energy Efficiency Centre with perpetual succession
Fund	Central Renewable Energy Fund	Sustainable Energy Fund
Standards	Bind only inside subsidised programmes	Legal basis covering energy-using equipment, including its manufacture and import
Large consumers	Voluntary audits and benchmarking	Annual targets, monthly energy records, efficient technologies, replacement plans for energy-intensive machinery, mandatory audits and implementation
Government	Mainly federal action	Efficiency duties for all three tiers, with federal technical support

The efficiency provisions would apply to seven sectors: businesses, industries and commercial establishments; transport vehicles; government, commercial, residential and business buildings; service institutions such as hospitals, schools and universities; agriculture, irrigation and drinking water; energy-using equipment, including its manufacture and import; and electricity generation, transmission and distribution.

The import clause is the hook for turning appliance drafts into enforceable rules, and the obligations on establishments are exactly what the sectoral benchmarks were built for. Industry will still ask practical questions: which establishments will be designated and at what threshold, how targets will be set and tightened, who will certify auditors, how plant data will be protected, and what support will come with the obligations. The regulations that answer them will decide whether the law is seen as a burden or an opportunity.

What the private sector needs from the new Centre

1. Predictability. A published, phased schedule for appliance MEPS and labels — starting with motors, pumps, fans, refrigerators, air conditioners and electric cooking appliances — and for sectoral SEC thresholds, so businesses can plan investment.

2. Standards built on Nepali data, with industry at the table. Thresholds by size class and product type, set after consultation with industry associations, starting with reporting obligations before improvement targets.

3. A level playing field at the border. Stronger RETS and accredited laboratories, recognition of credible regional test reports, and market surveillance at import and retail.

4. A recognised profession. Certification and accreditation for energy auditors and managers, a common audit format aligned with ISO 50002, and public procurement that weighs quality, not price alone.

5. Finance that follows the audit. Concessional credit, partial risk guarantees and support for energy service companies from the Sustainable Energy Fund, with rewards for plants that go beyond the minimum.

6. One trusted data system. A single confidential platform for energy records, audit results and appliance registrations, letting the Centre track the 1.68 percent goal and report savings under Nepal's NDC 3.0 and its 2045 net-zero target.

7. A standing partnership. A regular forum where the Centre, NBSM, customs, utilities, industry associations and service providers review standards, enforcement and market response together.

Closing: raising the floor together

AEPC's first thirty years were about access. The next thirty will be about performance — making sure the energy Nepal produces is used well. AEPC has laid a solid foundation: a tradition of technical standards, a decade of efficiency programmes, drafts for twelve appliance categories and, for the first time, Nepali benchmarks for the most energy-intensive sectors. The new law can supply the authority. Turning it into lasting practice will take government and the private sector raising the floor together.

"AEPC's first thirty years were about access. The next thirty will be about performance."



IN HIS OWN VOICE

Bibek Tulachan Thakali

CEO, T3 Thakali Group
President, Thakali Bhansa Ghar Sangh

4	pellet cookstoves installed
~70 kg	of pellets burned a day
~40%	saved on fuel costs
No	subsidy taken

> *We have the technology, we have the local fuel, and we have a business case. We do not always need to wait for a crisis—or a subsidy—to make the right decision. Sometimes, using our own resources is the smartest investment we can make.*

— BIBEK TULACHAN THAKALI

VOICES

Why Wait for LPG When We Have Our Own Fuel?

For a restaurant, fuel, water, and electricity are the three essentials that keep the business running. When a crisis disrupts even one of them, the entire investment is at risk. Without fuel, we cannot cook, serve our customers, or keep our business running.

This is why I decided to replace our LPG stoves with biomass pellet cookstoves. The decision was driven by the opportunity to reduce operating costs, use locally produced Nepali fuel, and make our business less dependent on a single fuel source.

We installed four pellet cookstoves, each costing approximately NPR 1.15 lakh. Today, our Thakali restaurant consumes around 70 kilograms of biomass pellets every day, and we have achieved approximately 40 percent savings in fuel costs.

However, the real value of this decision became clear during Nepal's recent LPG supply crisis, particularly in Kathmandu, when many restaurants and households struggled to obtain LPG cylinders for weeks. While some restaurants had to shut down because they could not cook without LPG, we continued serving our customers. We could simply turn on our pellet cookstoves and prepare meals as usual.

We had made the switch for economic and practical reasons, not simply in anticipation of a crisis. But when the crisis came, it proved just how right our decision had been. This technology was not just saving us money; it was protecting our business.

What makes me even happier is that we are using our own Nepali fuel. Biomass pellets provide an opportunity to reduce our dependence on imported LPG while creating demand for local pellet producers.

One thing I particularly want to highlight is that we made this investment without receiving any subsidy. Government support could help more restaurants with the initial investment. But I believe we should also ask ourselves: why wait for a subsidy when our own local fuel can save money and protect our businesses during a crisis?

As President of the Thakali Bhansa Ghar Sangh, I have been encouraging other Thakali restaurant owners to explore this technology. Some have already switched to biomass pellet cookstoves, while others are in the process of adopting them. Wider adoption can strengthen the market for locally produced pellets.

My message to other restaurant owners is simple: do not think about energy only when a shortage occurs. For me, switching to biomass pellets has brought three important benefits: lower fuel costs, the ability to continue serving customers during an LPG crisis, and the satisfaction of supporting a local fuel industry.



A biomass pellet cookstove at work in a Thakali restaurant kitchen



Gita Saud Thapa at Narigad I



Sarala Sarki at the rehabilitation site



Himalaya Garment laundry, Jumla



Padma Ramjali at her tailoring shop

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Stories from the Field

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STORY 1 · SOLAR MINI-GRIDS

Solar Mini grids (SMGs) Transform Lives in Upper Dolpa, Nepal

Dolpo Buddha and Shey Phoksundo Rural Municipalities, Dolpa



A solar mini-grid in Upper Dolpa

Energy access where geography poses its greatest challenges: High in the remote Himalayas of northwestern Nepal, where settlements lie at elevations ranging from 3,900-4,200 meters above sea level, access to reliable electricity has long been constrained by rugged terrain, extreme weather and isolation from transport infrastructure. The considerable distances from roadheads and airports, combined with the need to protect a fragile natural environment, make conventional electrification exceptionally challenging and costly. In this demanding landscape, solar energy is opening new possibilities. Through the project Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal, 10 SMG subprojects with a combined installed capacity of 523 kWp have been implemented in Dolpo Buddha and Shey Phoksundo Rural Municipalities. These systems mark a significant step towards expanding access to electricity in some of Nepal's most geographically isolated communities. For residents who previously depended primarily on individual solar home systems for basic lighting, the SMGs represent a transition towards a more reliable community electricity service. Their significance extends beyond household illumination to improved public-space lighting, more flexible working and study hours, better access to information and new opportunities for local enterprises.

FACT BOX

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

Financing
Federal Government of Germany through KfW Development Bank, Government of Nepal and Local Governments

Implementing Agency
Alternative Energy Promotion Centre (AEPC), Nepal

Location
Dolpo Buddha and Shey Phoksundo Rural Municipalities, Dolpa District, Karnali Province, Nepal

Scale
10 solar mini-grids, 523 kWp, serving 774 households, 79 enterprises and 54 public services

Ten Mini grids, two clusters, one shared ambition: 10 SMG subprojects collectively serve 774 households, 79 enterprises, including homestays, and 54 public service entities. Together, the systems demonstrate the potential of decentralized solar energy to overcome geographical barriers to electricity access and deliver essential services in communities where conventional grid extension remains difficult.

Visible changes in everyday life: The value of the SMG subprojects is most evident in how electricity is being used by local communities. In communities where agricultural activities are strongly influenced by seasonal conditions and available daylight, improved illumination provides greater flexibility for completing essential work. Local farmers are now harvesting Uba, the locally grown barley, during the evening with the support of streetlighting.



Street lights from the mini-grid over harvested barley (Uba) at dusk

Similarly, local residents also reported that streetlighting had helped reduce risks of snow leopards entering villages at night and attacking sheep and goats. They recalled substantial livestock losses in the preceding year and perceived better nighttime illumination as a protective measure. Although the effect on livestock losses requires systematic monitoring, these accounts highlight the importance residents attach to better-lit public spaces and their sense of security.

Electricity is also supporting education and public services. At Kalang basic school, classroom lights were being used during the daytime when cloudy weather reduced natural illumination. Community leaders further reported that children were studying for longer and household activities were continuing later into the evening. At health posts and other public institutions, reliable electricity provides an important foundation for service delivery.

The SMG subprojects are also expanding access to information. Some shopkeepers had already purchased televisions to watch news and obtain information from beyond their remote settlements. For local enterprises and homestays, electricity creates opportunities to improve lighting, customer services and communications including internet, while laying the groundwork for wider productive uses of energy.

The inhabitants of Upper Dolpa, many belonging to the Dolpo community, maintain distinctive Buddhist cultural traditions and ways of life shaped by the Himalayan environment. Extending electricity to these settlements is therefore not simply a technical achievement; it is an investment in inclusive development that responds to local needs while recognizing the region's cultural and environmental significance.

Post installation support of long-term operation and maintenance for ten years ensures the sustainability of the subprojects. Sustained benefits will also depend on effective local management, timely maintenance, spare-parts availability, financial viability and continued monitoring of system performance. In Upper Dolpa, installed SMGs are doing more than bringing electricity to remote Himalayan settlements. These SMG subprojects are creating conditions for safer public spaces, stronger community services and more inclusive development, helping energize a brighter future at the roof of the world.

STORY 2 · SOLAR ROOFTOP · INDUSTRY

Solar Rooftop for Commercial & Industrial (C&I) Entities for Decarbonization

Shiv Shakti Agri Pvt. Ltd., Jeetpur Simara, Bara



730.36 kWp grid-connected solar rooftop at Shiv Shakti Agri Pvt. Ltd.

In Nepal's industrial sector, rising electricity costs and dependence on diesel-based backup energy present challenges to operational efficiency and environmental sustainability. The Shiv Shakti Agri Pvt. Ltd. Solar Roof Top (SRT) subproject demonstrates how targeted financial support can encourage industries to adopt clean energy and advance industrial decarbonization. Implemented under the Government of Nepal's Alternative Energy Promotion Centre (AEPC), through the Promotion of Solar Energy in Rural and Semi-urban Regions (DKTI), with co-financing from the Federal Republic of Germany through KfW, the subproject supports the installation of 730.36 kWp grid-connected solar rooftop system at Shiv Shakti Agri Pvt. Ltd. in Jeetpur Simara, Bara. The subproject received financial assistance through an interest-rate subsidy covering 50% of the applicable interest rate for five years, helping to improve the financial viability of the investment.

FACT BOX

Where
Jeetpur Simara, Bara

System
730.36 kWp grid-connected solar rooftop

Results
8–10% lower monthly electricity bill; solar meets about 70% of daytime demand

Mr. Satish Kumar Agrawal, Chief Executive Officer of Shiv Shakti Group, said that the SRT subproject has contributed to an estimated 8–10% reduction in the monthly electricity bill, while daytime solar generation meets approximately 70% electricity demand of the industry. Mr. Agrawal also reported that the significant reduction in diesel consumption, with expenditure on diesel being reduced to approximately 70% of its previous level. These early results indicate the potential of SRT to reduce operating costs, improve energy security, and lower reliance on fossil-fuel-based backup generation.

The experience of Shiv Shakti Agri highlights the role of minimal subsidy support in accelerating private-sector investments and leverages on clean energy adoption. With systematic monitoring of electricity savings, diesel displacement, and greenhouse gas emission reductions, this initiative can further demonstrate the contribution of SRT subprojects in commerce and industrial (C&I) entities to Nepal's broader energy transition and climate objectives. The Shiv Shakti Agri SRT subproject illustrates how targeted financial incentives can help industries transition towards cleaner, more cost-effective, and more reliable energy use.

STORY 3 · SOLAR ENERGY FOR HEALTH FACILITIES

Solar Energy for Reliable Healthcare

A Success Story of Chandra Narayan Yadav Memorial Maternity Hospital, Siraha, Nepal



Solar rooftop at the maternity hospital in Madar, Siraha

The Chandra Narayan Yadav Memorial Maternity Hospital run by the Chandra Narayan Yadav Memorial Trust in Madar, Siraha District, is a 25-bed community-based non-profit healthcare and maternity facility. Serving communities across Siraha and surrounding local areas, the hospital also receives patients from neighboring India, with approximately 35-40 people visiting daily for medical services.

To strengthen the reliability of healthcare delivery, the AEPC/DKTI Project supported the installation of an 18 kWp solar photovoltaic system with 50 kWh of battery storage at the hospital. The system supplies electricity to critical service areas, including the laboratory, eye care unit and maternity ward, helping maintain essential healthcare operations during grid outages, when the hospital would otherwise rely on diesel generators.

The solar installation represents an important step towards resilient, reliable and sustainable healthcare services. By providing an alternative source of electricity, the system helps reduce dependence on the conventional grid and supports the continuity of essential diagnostic and maternity care services, particularly when uninterrupted energy is crucial for patient care. Battery storage further enhances the system's ability to supply electricity when solar generation is unavailable, subject to available stored energy and system load.

The intervention is particularly significant given the hospital's strategic location in southern Nepal, near the Indian border, and its role in serving communities on both sides of the border. Reliable electricity infrastructure strengthens the hospital's capacity to respond to local healthcare needs and improves the enabling conditions for safe, accessible and dependable medical services.

The installation demonstrates how renewable energy can support healthcare infrastructure while contributing to Nepal's broader goals of clean energy adoption and sustainable development. Through the AEPC/DKTI Project, solar energy has become a realistic investment in healthcare resilience, helping create a more reliable environment for patients and healthcare professionals alike.

FACT BOX

Where
Madar, Siraha District

Facility
25-bed community-based non-profit maternity hospital, run by the Chandra Narayan Yadav Memorial Trust

Patients
About 35–40 people a day, including from neighbouring India

System
18 kWp solar PV with 50 kWh battery storage

Powers
Laboratory, eye care unit and maternity ward

STORY 4 · SOLAR IRRIGATION

From Diesel to Solar Pumping: Harvesting a Brighter Future with Solar Irrigation

A farmer in Kanchanpur is using solar-powered irrigation to increase his income



Sarita Chaudhary, wife of Mahendra Chaudhary, beside their solar irrigation pumping system in Punarbas Municipality, Kanchanpur District.

In the fertile agricultural plains of Punarbas Municipality in Kanchanpur District, Sudurpaschim Province, smallholder farming is the backbone of rural livelihoods. However, infrastructure gaps, particularly the lack of reliable and affordable irrigation, have constrained agricultural productivity. Among them is Mahendra Chaudhary, a 45-year-old farmer of the Tharu community, balancing agriculture with his work as a tractor driver to support his family. Mahendra owns 20 kattha (6772.6 m^2) of land and lives with his parents, wife Sarita and their son and daughter. Agriculture has always been an important part of their livelihood, but access to irrigation was a major challenge.

FACT BOX

Where
Punarbas Municipality, Kanchanpur, Sudurpaschim Province

System
Solar irrigation pumping system–small (SIP-S), 9 September 2025

Income
NPR 130,000–145,000 a year before; about NPR 300,000 now

Before adopting solar irrigation, he used diesel generator to draw water from a four-inch borewell, consuming approximately 150 litres of diesel annually for irrigation. Besides the recurring fuel expense, he had to deal with the inconvenience of purchasing diesel and its uncertain availability in the local market. These challenges limited his ability to expand agricultural production and diversify into commercial vegetable farming. His farming was limited to two main crops, paddy during the monsoon and wheat in winter. Vegetables were grown mainly to meet household needs, rather than as a significant source of income.

Mahendra was impressed with solar irrigation after seeing two other farmers in his village using similar systems and wanted to adopt the technology. When the Alternative Energy Promotion Centre (AEPC) invited demand for solar irrigation systems under the *Promotion of Solar Energy in Rural and Semi-Urban Regions (DKTI)* project, he learned about the scheme through a company representative and decided to take the opportunity.

Through the AEPC/KfW-DKTI project, 60% of the total project cost was provided as a subsidy, while Mahendra was responsible for constructing the civil structures and digging the borewell. His solar irrigation pumping system-small (SIP-S) was installed on 9 September 2025. The system now provides him with a more convenient and sustainable way to irrigate his farmland.

More Crops, More Income and New Opportunities

The change in Mahendra's farming practices has been significant. With improved access to irrigation, he has expanded beyond the traditional paddy–wheat cropping pattern and introduced a wider variety of crops.

During the winter season, he now cultivates wheat, potato and tomato in one cropping cycle, followed by green vegetables, bitter gourd, radish, cucumber, mustard and other crops. Paddy remains his main monsoon crop. This more diversified approach allows him to make better use of his land and explore opportunities to earn income from vegetables as well as staple crops.



Mahendra Chaudhary and his wife, Sarita Chaudhary, at their vegetable farm

The financial improvement has been particularly encouraging. Before installing the solar irrigation system, Mahendra earned approximately NPR 130,000–145,000 annually from his farming activities. He now reports annual farming income of around NPR 300,000, with the potential for further growth as he continues to improve his production and marketing practices.

The solar irrigation system has also removed the recurring burden of purchasing diesel for irrigation. The savings in fuel expenditure, combined with increased agricultural earnings, have given Mahendra greater confidence to invest in his family's future.

For him, the benefits extend well beyond the farm. He has been able to invest more in his children's education and provide them with better educational opportunities. He is also planning to purchase advanced agricultural tools, which could strengthen his agricultural operations and provide additional opportunities to earn income.

A Farmer Embracing Innovation

Mahendra has also started adopting better agricultural practices, including mulching, to improve crop management and productivity. His experience reflects an important lesson: reliable irrigation can create opportunities, but combining it with improved farming techniques, crop diversification and sound farm management can help farmers make the most of those opportunities. With more reliable access to water, Mahendra now plans his cultivation with greater confidence and considers crops that have greater economic value. His growing experience is helping him move from farming primarily for household needs towards a more market-oriented approach.

Inspiring Other Farmers to Follow

Mahendra's journey has come full circle. Just as he was encouraged by two farmers in his own village who had already adopted solar irrigation, his progress is now attracting the attention of other farmers in neighbouring villages. Many have started asking about the system, support scheme and its benefits.

As more farmers learn from his experience, Mahendra Chaudhary's journey may inspire a wider shift towards sustainable, productive and climate-friendly agriculture across the farming communities of Sudurpaschim Province.

STORY 5 · MINI HYDRO PROJECT · KARNALI

The Chukeni Khola Mini-Hydro Project: A Community-Owned Model

A 998 kW community-owned mini-grid in Patarasi Rural Municipality bringing reliable power to Jumla



Jumla lights up at dusk, powered by Chukeni

A remote district waiting for power: Jumla, one of the ten districts of Karnali Province, spreads across 2,531 km^2 of high mountain terrain. Its Sinja Valley is where the Khas language, the root of Nepali, was born. Even three years after the national grid arrived, Jumla, Mugu and Kalikot lived with unreliable, poor-quality power, and local micro hydro plants offered only a stop-gap. Replacing a mini grid with an Isolated Distributed Renewable Energy System, designed with the provision for future interconnection with the national grid, was the appropriate approach once grid extension reached the project area

998 kW serving 11,531 Households: The Chukeni Khola Mini Hydropower Project (CKMHP) in Patarasi Rural Municipality is providing reliable electricity to a total of 11,531 households. Of these, 3,320 households are directly connected as CKMHP consumers, while an additional 8,211 households are being supplied through the Nepal Electricity Authority (NEA) under a Power Exchange Agreement (PEA) implemented through the applicable net-metering provision.

The Chukeni Khola Mini Hydropower Project (CKMHP) is owned and managed by Chukeni Khola Electricity Cooperative Limited, a legally registered cooperative under the Division Cooperative Office, Surkhet, Karnali Province. The project was developed through a collaborative financing arrangement comprising financial assistance from the Asian Development Bank (ADB) under the South Asia Subregional Economic Cooperation–Power System Expansion Project (SASEC-PEP), support from the Alternative Energy Promotion Centre (AEPC), community equity contributions, and loan financing. Technical support for the project's development and implementation was provided by the Project Implementation Consultants (PICs) and the Renewable Energy for Rural Livelihood (RERL) Programme.

FACT BOX

Capacity
998 kW · gross head 143.25 m · design discharge 1.00 m^3/s

Energy
7.5 GWh a year (2.859 GWh dry, 4.641 GWh wet season)

Reach
11531 households

Total cost
NPR 446.38 million (generation 307.50 million; transmission and distribution NPR 138.87 million)

Financing
AEPC Subsidy funded through ADB SCF Grant 0398 & GoN matching grant (NRs. 284.43 million), ADB ADF Loan channelized through partner bank (Agricultural Development Bank Ltd) NRs. 60 million and community upfront equity NRs. 50.593 million.

Owner
Chukeni Khola Electricity Cooperative Ltd.



The 998 kW Chukeni Khola powerhouse and penstock, Patarasi Rural Municipality

Owned by the community: The plant is run by Chukeni Khola Electricity Cooperative Limited, registered with the Division Cooperative Office in Surkhet. A 19-member executive committee, 13 men and 6 women, oversees both the cooperative and the power plant. The cooperative works through two windows: a project development department that handles service, tariffs and power for rural enterprises, and a saving and credit department that runs micro-finance and training in financial literacy, tariff collection, income generation and productive energy use.

Finance in women's hands: Members of the women's groups save regularly and lend to one another for household emergencies and for vegetable farming, poultry and goat and pig rearing. Clean energy has come with better access to finance, especially for women.

COMMUNITY OWNERSHIP

3,453
shareholders in the cooperative, 1,380 of them women

1,897
members in 100 women's saving and credit groups

90%+
of borrowers are women

Access to Finance for sustainability: The project has played a significant role in strengthening the financial empowerment of women and men from marginalized communities by promoting their participation in regular savings and credit schemes. To date, 100 Women's Savings and Credit Groups, comprising 1,897 members, are in operation. The accumulated savings are mobilized among group members to address emergency household needs and to finance income-generating activities such as vegetable farming, poultry raising, and goat and pig rearing. More than 90% of borrowers are women, highlighting the project's strong contribution to women's economic empowerment and improved access to financial resources. In addition to providing reliable access to clean energy, the small/mini hydropower project has stimulated local economic activities by enabling households particularly women, to invest in productive enterprises, diversify their livelihoods, and strengthen their long-term economic resilience

Business picks up: Ram Ashish Sah, Chief of NEA's Distribution and Consumer Services in Jumla, says six consumers have already applied for three-phase meters, a clear sign of growing business. Sales of solar panels in Jumla Bazar have fallen as trust shifts to the hydropower supply.

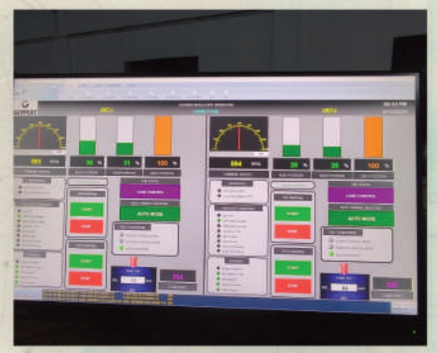
More to come: AEPC has commissioned four more mini hydro projects: Simrutu (200 kW, West Rukum), Lower Bom Khola (200 kW, Solukhumbu), Middle Phawa Khola (500 kW, Taplejung) and Giri Khola (200 kW, Jumla). Together with Chukeni they total 2,098 kW, and two more projects of 1,498 kW are under construction. The approach matches the National Planning Commission's Sustainable Distributed Generation and Grid Access (SUDIGGA) report, which envisions distributed electricity across all 753 local levels.



Building the distribution network



Women's group meeting, Patarasi, Jumla


Plant control system at Chukeni

> *"As the sun sets over Patarasi, the lights of Jumla and Mugu come on. In the heart of the Himalaya, Jumla is no longer just surviving; it is flourishing. Community-owned mini hydro proves once again that small is still beautiful."*

STORY 6 · MICRO-HYDRO · WOMEN'S LEADERSHIP

Gita Brings the Lights Back

When floods and deteriorated equipment plunged Pandusen into darkness, the local users' committee mobilized quickly to restore the village's only energy plant, completing the rehabilitation within just one and a half months. Gita Saud Thapa, who served as the committee's Vice-Chairperson, played an important role in supporting the community-led effort to bring electricity back to the village.



Gita Saud Thapa beside the rebuilt canal of the Narigad I micro hydro plant, Pandusen.

For more than a decade, the 37 kW Narigad I micro hydro plant was the only source of electricity for around 325 households in Pandusen, Budhinanda Municipality-8. In recent years it had become unreliable. Floods damaged its canals and intake, mechanical parts wore out, and the village was often left in darkness for days. "Electricity was unreliable, and our daily lives were constantly disrupted," recalls Gita Saud Thapa, 36.

Change came with financial and technical support from the RERAS project. The plant was fully rehabilitated: the mechanical faults were fixed, the civil structures rebuilt, and its capacity rose from 37 kW to 45 kW. "The plant now looks brand new," Gita says. "We couldn't believe how quickly the transformation happened just in one and a half months!"

The community did the work itself. The seven-member users' committee, with Gita as vice-chair, managed materials, labour and logistics, which built a strong sense of local ownership. Gita also worked on site as a labourer and earned NPR 15,000 in wages.

The committee changed how the plant is run, too. "Earlier, weak management led to frequent breakdowns," Gita admits. It now holds regular meetings, collects tariffs strictly and keeps a maintenance fund, and local operators have been trained to repair and maintain the plant. Today Pandusen has its lights back, powered by teamwork and by the leadership of women like Gita.

FACT BOX

Where
Pandusen, Budhinanda Municipality-8

Plant
Narigad I Micro Hydro Project

Capacity
37 kW, now 45 kW after rehabilitation

Serves
About 325 households

Rebuilt in
One and a half months

"It was a proud moment working for my community's brighter future."

Gita Saud Thapa

STORY 7 · MICRO-HYDRO · INCLUSION

Sarala Helps Rebuild the Energy

A flood washed away the intake and canal of the Ikadigad I micro hydro plant. Sarala Sarki helped her community build it back stronger.



Sarala Sarki at the Ikadigad I rehabilitation site, Badera.

Sarala Sarki, 27, of Badera in Budhiganga Municipality-10, remembers the day a massive flood hit the Ikadigad I micro hydro plant, the only source of electricity in her community. The temporary intake and a large part of the canal were washed away, leaving about 350 households in the dark. A month later, temporary repairs brought the energy back.

With a grant of about NPR 4 million from RERL and its technical guidance, the community built a permanent intake and some 300 metres of masonry canal at a new, safer location about 200 metres from the old one. Where the new canal had to cross a river about 50 metres wide, the water was carried over on a suspended cable through a 300 mm HDPE pipe.

The turbine, driving belt and electrical parts were also replaced, at a cost of about NPR 1.2 million. The plant, which had fallen to about 20 kW, now generates 32.5 kW, 12.5 kW more than its design capacity.

Sarala sat on the seven-member rehabilitation committee, representing Dalit members of the community, and helped manage the work. She also worked on site from start to finish, carrying cement from the road and supplying sand and stone, and earned about NPR 30,000 for some 90 days of work. With RERL's facilitation, the plant passed to Shree Badhimalika Sana Kisan Krishi Sahakari Sanstha, a women-led cooperative chaired by Maya Shah. It hired a new management team through open competition; with steadier supply after the rehabilitation, customers now pay on time.

FACT BOX

Where
Badera, Budhiganga Municipality-10

Plant
Ikadigad I Micro Hydro Project

Output
About 20 kW before; 32.5 kW after

Serves
About 350 households

Investment
NPR 4 million (civil works) + NPR 1.2 million (equipment)

"For sure, if there was no RERL our plant would not have come to this situation ..."

Sarala Sarki

WOMEN AT THE HELM

Ikadigad I is run by a women-led cooperative



855 of 980 shareholders are women

7 of 10 executive members are women

NPR **250,000** overdue bills collected

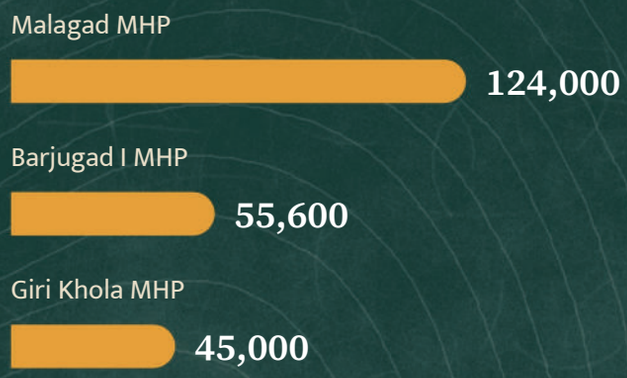
NPR **50,000** revenue a month

STORY 8 · MICRO-HYDRO · DIGITAL PAYMENTS

Digital Payments Strengthening Community Energy

Computerised accounting and digital bill-payment systems are helping community-managed micro hydropower plants improve revenue collection, strengthen financial discipline, and move towards greater operational sustainability.

PAID THROUGH ESEWA IN THE FIRST MONTH (NPR)



In remote villages, paying the monthly electricity bill has often meant delays and inefficiencies, and lost revenue for community-run micro hydro plants. Through the efforts of AEPC and the Central Renewable Energy Fund (CREF), the plants are adopting computerised account-keeping and online payment, making transactions smoother, more transparent and more efficient.

So far, 18 micro hydro plants have adopted computerised billing, and 10 of them have introduced eSewa, an online platform that lets consumers pay their monthly bills digitally. It has cut the time and effort needed to pay and improved revenue collection.

The impact was immediate. In the first month alone, consumers of Malagad paid NPR 124,000 through eSewa, Barjugad I NPR 55,600 and Giri Khola NPR 45,000. As more people learn the system, the number of users is expected to grow.

Payment habits have changed too. Users of Kuru Khola, Ikadigad I and Narigad II had struggled to pay their bills for more than six months. After their plants were rehabilitated and their executive committees restructured, they now pay regularly, and many are clearing old dues.

The change is more than a technical upgrade: it is a shift towards financial discipline and self-sufficiency that keeps community energy running.

FACT BOX

Computerised billing
18 micro hydro plants

Online payment
10 plants on eSewa

Overdue bills recovered
Kuru Khola NPR 35,320; Ikadigad I NPR 29,000; Narigad II NPR 25,000

STORY 9 · BIOGAS · CLEAN COOKING

Clean Energy, Meaningful Change

For families with limited resources, a household biogas plant can bring meaningful change, reducing dependence on firewood, creating a cleaner and more convenient kitchen, saving time and labour and transforming locally available bio waste into clean cooking energy and valuable organic fertiliser.



Sete Sarki with his biogas stove, Surkhet

A look at the home of Sete Sarki, who lives in Gurbhakot Municipality-13 in Surkhet, shows a life weighed down by want. Comforts are few, money is scarce, and even meeting daily needs is a struggle. Yet amid this hardship his home holds one asset that has made life a little easier and simpler: a household biogas plant, built with a subsidy from the Government of Nepal.

For Sete, biogas is not just a way to cook; it is a dependable support that eases the hardships of each day. Before, the family had to gather firewood, spend time and labour, and cook in a smoke-filled kitchen. Biogas has reduced their dependence on firewood, made the kitchen easier to work in and saved time. His home has few material comforts, but biogas has met one important need. Cooking with energy made from dung that would otherwise go to waste, and using the organic fertiliser from the slurry, is in itself a meaningful step towards making good use of local resources and towards clean energy.

This change in Sete Sarki's home teaches us something important: the value of development should be measured not by the height of buildings but by the ease it brings to people's lives. For a family with little money, even small support can be a great relief. More than a biogas plant has been built in Sete Sarki's home; a path to an easier life has opened amid want, and it stands as an example that modest support can bring meaningful change to a life.

This is the true achievement of alternative energy: technology that is not limited to the comforts of the well-off, but becomes a means of making life easier for the poor.

At a glance

Location
Gurbhakot Municipality-13, Surkhet

Technology
Household biogas plant

Replaced
Firewood and a smoky kitchen

Added benefit
Organic fertiliser from the slurry

> *"Expanding clean energy technology: the foundation of a better environment and a healthy life*

STORY 10 · CLEAN COOKING · MADHESH

Advancing Clean Cooking Solutions

Clean Cooking Solution (CCS) Project in Madhesh Province is helping households make everyday cooking more convenient and use energy more efficiently. Experiences shared by beneficiaries using electric cookstoves (ECS) and improved cookstoves (ICS) in Bardibas Municipality, Hariwan Municipality and Jagarnathpur Rural Municipality illustrate the practical value of promoting clean cooking solutions through local government partnerships.



ECS distributed in Bardibas Municipality



ICS used in Hariwan Municipality

From time-consuming cooking to greater convenience

In Bardibas Municipality–5, Mahottari, Ms. Shyam Maya Waiba reported positive changes after adopting an electric cookstove. Previously, her household relied heavily on LPG and needed time and effort to collect firewood. Cooking also took time away from other household responsibilities and supporting her children's studies. With the electric cookstove, she reported reduced dependence on LPG, less need to collect firewood and more time for other activities. The time saved has also created an opportunity for her to undertake sewing and tailoring work to support the household's income.

A similar shift towards more convenient cooking is seen in Hariwan Municipality–8, Sarlahi, where Mr. Samir Shrestha uses an improved cookstove. His household previously faced smoke from traditional cooking, substantial firewood use and the cost and inconvenience associated with LPG. The improved cookstove allows the household to use small pieces of wood more efficiently and has helped reduce reliance on LPG, improve cooking convenience and reduce smoke compared with the traditional stove.

FACT BOX

Where
Bardibas–5, Mahottari; Hariwan–8, Sarlahi; Jagarnathpur Rural Municipality–5 (Cluster-2, Madhesh Province)

Technology
Electric cookstoves (ECS) and improved cookstoves (ICS)

In Jagarnathpur Rural Municipality–5, Mrs. Sukhadi Ram has also experienced practical benefits from using an improved cookstove. The household reports less smoke, lower firewood consumption and shorter cooking time. Cleaning utensils has also become easier, making daily kitchen work more manageable.

A shared step towards cleaner cooking

Together, these household experiences show how clean cooking technologies can help reduce cooking-related workloads, improve kitchen conditions and use fuel more efficiently. While the benefits differ according to household needs and the technology used, the stories point to the importance of working with local governments and communities to make suitable clean cooking options accessible. Continued awareness, reliable technology support and follow-up will be important to sustain these benefits and encourage wider adoption across Cluster-2.



ICS used in Jagarnathpur Rural Municipality

“The time saved has also created an opportunity for her to undertake sewing and tailoring work to support the household’s income.

The CCS Project, implemented by AEPC with support from the Green Climate Fund and local-level cost sharing, continues to support the transition towards cleaner and more sustainable cooking practices. These experiences from Cluster-2 offer encouraging examples of how clean cooking technologies can contribute to more convenient daily life for local households.

A Laundry That Beats the Cold

In freezing Jumla, an electric washing machine turned Ambika Shrestha's small idea into one of the bazaar's most trusted businesses.



The 25 kg washing machine and staff at work, Himalaya Garment (Laundry), Jumla Bazaar.

In the cold Himalayan district of Jumla, freezing temperatures make everyday chores like washing clothes slow and hard. Ambika Shrestha, a single woman and a person with a disability, saw an opportunity. She runs Himalaya Garment (Laundry), now one of the most trusted laundry services in Jumla Bazaar.

With support from the SASEC Project, Ambika received a laundry machine that washes 25 kilograms per cycle. It cut the time and physical effort of laundry work and suits Jumla's harsh climate. Within two months, the small initiative had grown into a reliable service for households, hotels, hospitals, schools and offices.

The laundry washes and irons clothes and cleans coats, bags, down jackets, sleeping bags and blankets, handling both individual and bulk institutional orders. It employs five people, three women and two men, and earns about NPR 180,000 a month. The electricity bill of around NPR 11,000 a month stays manageable because of the steady flow of customers.

The business has created local jobs, taken the burden of hand-washing out of the cold, saved customers time and built a women-led enterprise that institutions now rely on.

FACT BOX

Where
Jumla Bazaar, Jumla

Enterprise
Himalaya Garment (Laundry)

Equipment
Washing machine, 25 kg per cycle

Jobs
Five: three women, two men

Electricity
About NPR 11,000 a month

NPR
180,000
monthly income of the laundry

STORY 12 · SOLAR MINI-GRID · ENTERPRISE

The Tailors of Gutu

Electricity from a solar mini-grid has lifted the tailoring businesses of two women in Gutu.



Padma Ramjali at work in her tailoring shop, Gutu.

4

Padma Ramjali, 31, runs a tailoring business in Gutu. For years, ironing was her biggest problem: she had to collect coal to heat a fire-based iron, which took time and delayed deliveries. Since the solar mini-grid brought electricity, she uses an electric iron, which is far easier and saves her a lot of time.

Her income has changed her standing at home. She pays her son's school fees, saves regularly in several savings groups and manages the household expenses. Before tailoring, she depended on her husband for money, and when she was unemployed no one listened to her in a financial emergency. Now she makes household decisions herself, sends her son to a boarding school and sits on the executive committee of Chaukune Solar Electricity Users' Cooperative Limited. Next, she plans to buy an electric sewing machine.

Jamuna Nepali and her four-member family have run a tailoring business for many years. After the solar mini-grid was installed, they expanded into a small garment industry, investing NPR 4 lakh in four electric sewing machines. They plan to make school uniforms and tracksuits, and already have an order for a school's tracksuits.

In Gutu, electricity from the mini-grid is helping new enterprises start, existing businesses grow and new jobs appear.

FACT BOX

Where
Gutu

Energy
Solar mini-grid, run by Chaukune Solar Electricity Users' Cooperative Ltd.

Padma
Electric iron in place of a coal iron

Jamuna
Four electric sewing machines, NPR 4 lakh invested



Jamuna Nepali's garment workshop, with its new electric sewing machines.

STORY 13 · SOLAR FOR HEALTH

Institutional Solar Photovoltaic System (ISPS)

A health station in Chaukune Rural Municipality, Surkhet



ISPS has brought bright electric lighting to this modest birth center

In Chaukune Rural Municipality Ward -2, a remote village nestled in Surkhet District, a modest health station has undergone a truly remarkable transformation, courtesy of the invaluable benefits brought forth by solar energy.

Previously, the challenges of delivering babies after sunset were daunting, primarily due to inadequate lighting resources. However, the implementation of solar-powered lights has ushered in a new era, ensuring that mothers now experience safer and brighter deliveries, thereby significantly enhancing the overall well-being of both mothers and their newborns.

The positive impact of the solar energy system extends beyond the realm of maternity care. The health station has gained the capacity to operate an electric sterilizing machine, a capability that was once unattainable in the absence of a reliable energy supply. This is essential in maintaining hygienic conditions, thus ensuring the safety and well-being of both patients and healthcare providers alike.

Furthermore, the influence of solar energy has extended working hours for the health station well into the night. Additionally, it has facilitated community connectivity by enabling the health station to charge phones and utilize a computer for communication with larger hospitals. In this challenging, remote locale where securing an ambulance proves to be a formidable task, the ability to communicate with other hospitals serves as a lifeline, guaranteeing timely assistance for those who are sick or injured. In essence, this solar energy initiative assumes the role of a superhero for the health station, not only improving life within the community but also emerging as a beacon of hope, particularly for mothers and families in need.

It's worth noting that this installation is just one among the 1383 similar installations spread across Nepal, reflecting the impactful role of the Alternative Energy Promotion Centre (AEPC) in illuminating lives and enhancing livelihood in rural areas.

FACT BOX

Where
Chakune Rural Municipality Ward-2, Surkhet

System
Institutional solar photovoltaic system (ISPS)

Enables
Lighting for night-time deliveries, an electric sterilizer, phone charging and a computer

Scale
One of 1,383 similar installations across Nepal



Community Health Post in Puchma Village, Chaukune Municipality, Surkhet.

STORY 14 · SOLAR DRINKING WATER

Rural Solar Drinking Water Project (RSDWP)

Sunar Tole, Miklajung Ward No. 2



Solar panels and the water tank of the Sunar Tole drinking water project

After navigating a challenging six-hour off-road drive from Damak in Jhapa, one arrives at the small town of Rabi Bazar. From there, a more difficult one-hour journey leads to the secluded village of Sunar Tole in Miklajung Ward no. 2. Comprising approximately 28 households, this village has grappled with water-related issues for generations.

In the past, acquiring water for the villagers was an ordeal, women had to endure early morning chores of fetching for drinking water, starting as early as 4 o'clock in the morning. The scarcity of water had far-reaching consequences, contributing to the village's overall underdevelopment.

FACT BOX

Where
Sunar Tole, Miklajung Ward No. 2

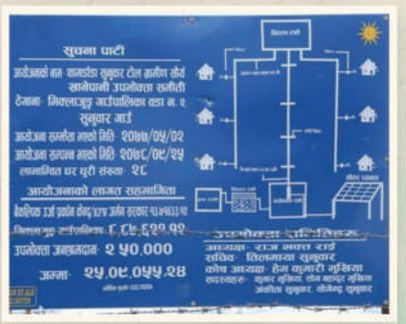
Households
About 28

Completed
December 2021

Cost
Rs. 2.5 million

Upkeep
Rs. 50 a month from each household

In December 2021, with support from KfW and local municipality, AEPC successfully implemented a solar drinking water project in this village at a total cost of Rs. 2.5 million. This transformative initiative has significantly reshaped the socio-economic fabric of the village, liberating women from their early morning struggles. The time once consumed by water collection is now redirected towards income-generating activities. Diseases stemming from polluted water have noticeably dwindled with the introduction of clean water distribution. The positive impact extends to education, as children no longer spend their mornings fetching water, enabling them to dedicate that time to homework. The village's sole school also benefits from a stable supply of pure drinking water.



Project notice board at Sunar Tole, showing the layout and cost sharing

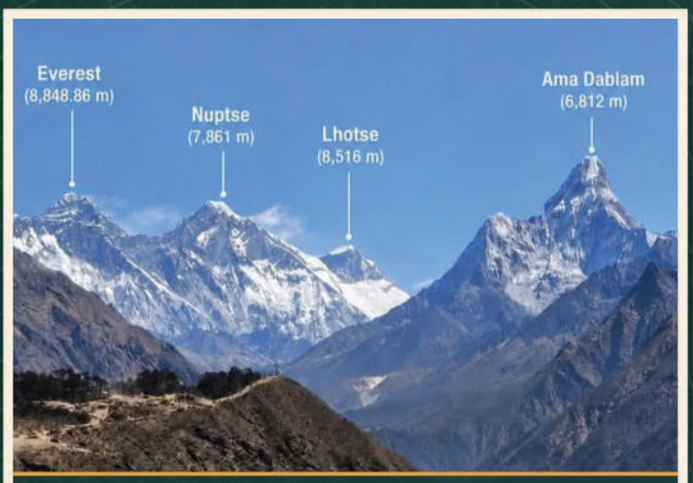
To ensure the sustainable maintenance of the water supply, each household contributes a monthly fee of 50 rupees. In essence, this project has not only quenched the literal thirst of the local residents but also satisfied their hunger for a modern and improved way of life.

STORY 15 · MINI HYDRO · EVEREST REGION

Powering the Roof of the World

MGEAP and Amadablam Mini Hydro Subproject

WORLD'S HIGHEST MINI HYDRO · 4,422 m



Power house location just below the mountains

Government of Nepal has signed an agreement with the World Bank to execute the "Nepal: Private Sector-Led Mini-Grid Energy Access Project (MGEAP)" to increase off-grid electricity generation capacity and provide reliable and sustainable electricity to remote communities from renewable energy mini-grids by privately led approach with the Energy Service Companies (ESCOs).

AEPC has selected Amadablam Mini Hydro Ltd. to promote the 911 kW capacity Amadablam Mini Hydro Subproject at the Khumbu Pasanglhamu Rural Municipality, Ward No. - 4 of Solukhumbu district. The Subproject is a run-of-river type (RoR) scheme and located inside the Sagarmatha National Park a touristic place of Nepal. The subproject utilizes water diverted from Cholunche Khola to generate 911 kW energy. Cholunche Khola is a perennial river which flows from the Himalaya peak on the Northern side of Solukhumbu district and is a tributary of the Imja River. The subproject is designed to generate 911 kW of electricity to provide reliable electricity to 451 local households. This Subproject has been supported by the Government of Nepal, the World Bank, Sustainable Energy Challenge Fund and Khumbu Pasanglhamu Rural Municipality. Siddhartha Bank Limited is Partner Bank for this Subproject.

This Mini Hydro Subproject lies near the Everest region and the World's highest altitude Mini Hydro Subproject. The boundary coordinates of the Subproject lies between latitude 27° 50' 50" N and 27° 51' 40" N and longitude 86° 47' 49" E and 86° 49' 19" E. The headwork's and intake site of the subproject is located at 27°50'56.52"N, 86°49'6.15"E and an elevation of 4,422 m. amsl and the powerhouse site is located at 27°51'12.98"N, 86°47'49.21"E and an elevation of 3,951.18 m amsl. Electricity will be supplied at the lowest village at 3,250 m and the highest village at 4,940 m.

FACT BOX

Subproject
Amadablam Mini Hydro Subproject, 911 kW

Location
Khumbu Pasanglhamu Rural Municipality-4, Solukhumbu, inside Sagarmatha National Park

Type
Run-of-river, Cholunche Khola

Elevation
Intake 4,422 m amsl; powerhouse 3,951.18 m amsl

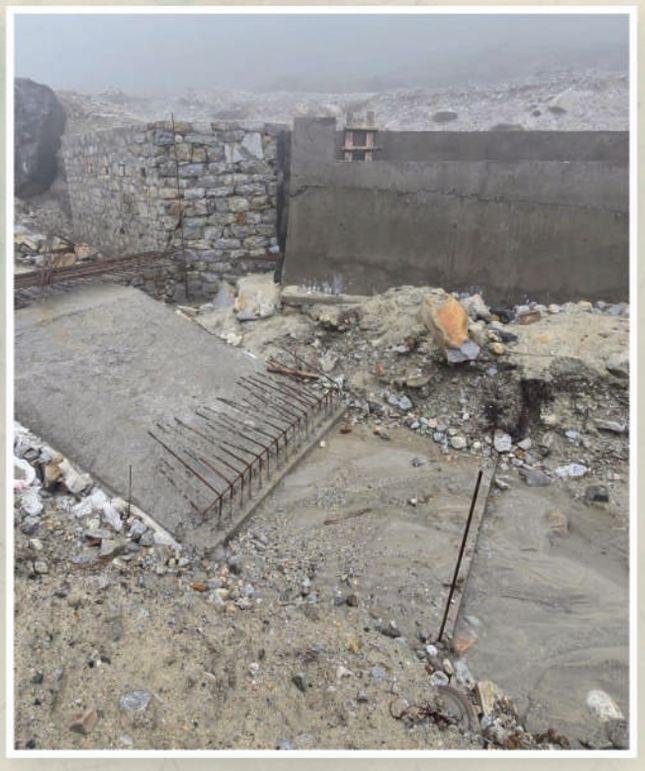
Serves
451 local households

Developer
Amadablam Mini Hydro Ltd.; partner bank Siddhartha Bank Limited

Programme
MGEAP, Government of Nepal and the World Bank

Status
Under construction, 46.66% physical progress; completion planned by 30 September 2027

Now this Subproject is under construction and 46.66 % physical progress has been achieved. Electro-mechanical equipment has been purchased from Greece by the supplier company Poseidon SA and arrived in Nepal. This Mini Hydro Subproject is planned to complete within 30 September 2027.



Headworks



Power house



Penstock pipe laying



Electro-mechanical equipment

Strategic Direction and Way Forward

AEPC's strategic direction is to become the Renewable Energy and Energy Efficiency Center: a national clean-energy facilitator, energy-efficiency regulator, resource mobiliser and innovation agency. The Renewable Energy and Energy Efficiency Bill, which is now in Parliament, will pave the way ahead.

- Clean energy access for all
- Energy mix and resource diversification
- Energy efficiency and conservation
- Climate and carbon finance and carbon trade
- Fuel switching and decarbonisation
- Governance and institutional strengthening
- Private sector engagement

1 · Immediate priorities

A Legislative
- Approval of the Renewable Energy and Energy Efficiency Bill
- Renewable Energy and Energy Efficiency Rules and required regulations
- Amendment of the AEPC regulation

B Institutional
- Organization and management survey
- Permanent office premises
- Provincial and local coordination with small units in each province

C Policy
- Integration of Renewable Energy and EE into national energy policy
- Battery Energy Storage Policy, including the PPA rate

D Financing
- Sustainable financing plan

Key strategic areas

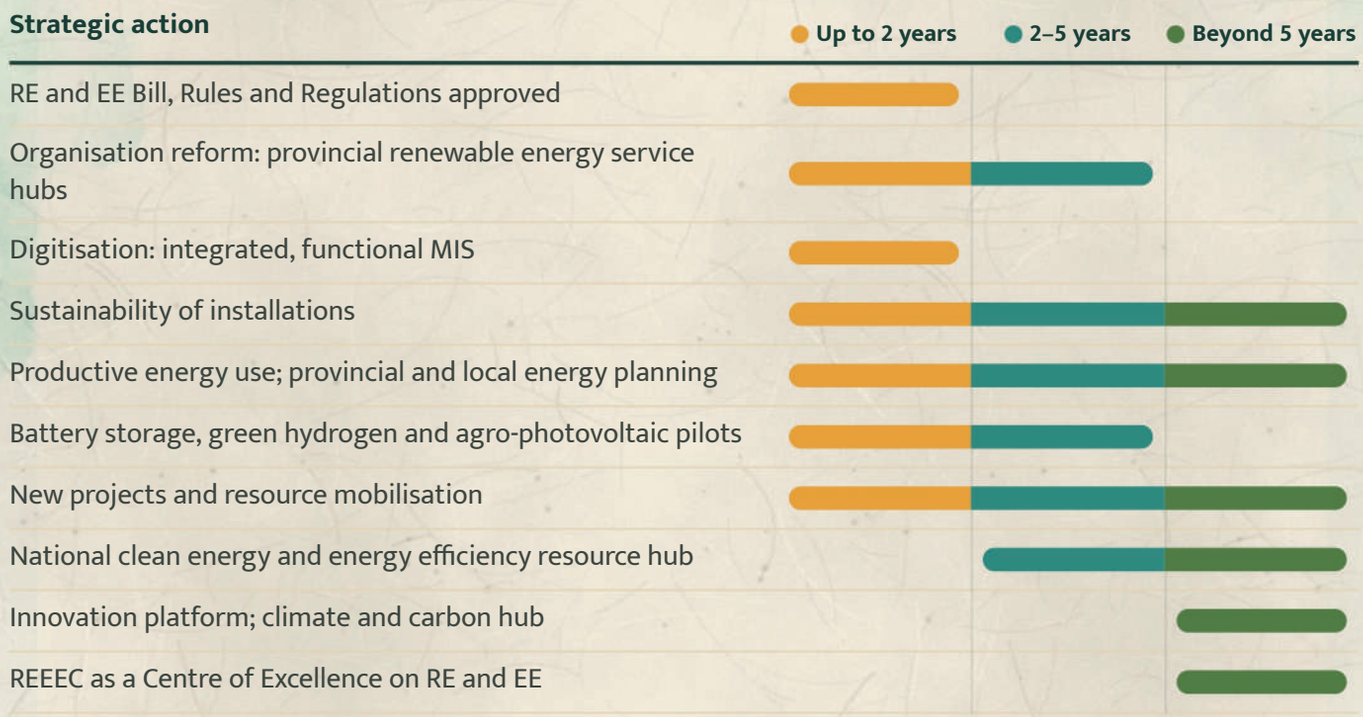
Green hydrogen · Energy efficiency · Solar PV with battery storage · Carbon trade · Climate finance · Industrial and agricultural decarbonisation · Solar thermal · Waste-to-energy · Agro-photovoltaics · Grid interconnection of RE system · Bio-briquettes and pellets



Electric Vehicle charging station in action

The Roadmap and the New Frontiers

What AEPC plans to do in the short, medium and long term, the new areas it will lead, and how it will keep what is already built working.



Keeping systems working

Lifecycle asset management and O&M support; rehabilitation and grid interconnection; local technicians and service centres; e-waste management; disaster resilience.

Inclusion and youth

Programmes for women, marginalised groups and remote communities; gender equality, disability and social inclusion; green jobs and enterprise for young people.

Pipeline and governance

Hand over completed projects with their assets and knowledge; a Project Development and Investment Facilitation Unit; KPI dashboards, digital carbon registry and remote monitoring.

Financial and Physical Progress

Mid-July 2025 to mid-July 2026: A glimpse of AEPC's annual progress report FY 2082/83

NPR 2,330.1 M
annual budget

NPR 2,186.9 M
expenditure

93.85%
financial progress

85.40%
overall physical progress

Budget, expenditure and progress

S.N.	Budget Subheads	Programme	Annual Budget '000'	Expenditure '000'	Financial Progress(%)	Physical Progress (%)
1	30800103	Alternative Energy Promotion Centre	39,71,11.21	33,78,03.69	85.07	83.77
2	30800104	National Rural and Renewable Energy Programme	1,93,30,00.00	1,84,91,19.33	95.66	85.73
		Total	**2,33,01,11.21**	**2,18,69,23.02**	**93.85**	**85.40**

Major achievements

1. 693 kW of micro and mini hydro and 604 kW of solar mini-grids, bringing electricity to rural households
2. Two solar drinking-water schemes, three micro-hydro irrigation schemes and 315 solar irrigation pumps
3. 16800 kW of solar rooftop at institutions
4. 15 disaster-damaged micro and mini hydro plants rebuilt; 1 connected to the national grid
5. 119,500 clean cooking technologies installed or distributed: household biogas, electric and improved cookstoves
6. Two large biogas plants completed



Women using biostove for cooking

CLEAN COOKING

119,500 clean cooking technologies installed or distributed

Household biogas, electric and improved cookstoves are replacing smoky fires in homes across Nepal.

AEPC Core Programme, Activity by Activity

Targets and achievements for the twelve activities funded by the Government of Nepal under AEPC's own budget head (30800103).

#	Programme / activity	Unit	Target	Achieved	Against target
1	Improvement and Reconstruction of Clean Development Mechanism (CDM) Registered Micro Mini Hydro and Improved Water Mill	no.	6	**10**	**166.6%**
2	Integration of micro/mini hydro projects in national grid	no.	1	**1**	**100%**
3	Incomplete and sick micro hydro completed and rehabilitation	no.	6	**3**	**50%**
4	Productive energy use of RE technologies	no.	3	**3**	**100%**
5	Detail Feasibility Study of Solar Mini Grid Projects	no.	10	**9**	**90%**
6	Solar pump for irrigation	no.	200	**185**	**92.5%**
7	Electricity generation from mini grid project (Multiyear program)	kW	250	**118**	**47.2%**
8	Solar Home System installation in community and religious places	no.	100	**0**	**0%**
9	Detail Feasibility Study of Institutional, Community Biogas plants	no.	10	**10**	**100%**
10	Clean energy program: replacement of dung cakes and agricultural residue for cooking	no.	18,000	**18,000**	**100%**
11	Orientation and Capacity Building of Local level, province level and stakeholder for RE	no.	3	**2**	**66%**
12	Support in energy efficiency to public and private institution	no.	5	**5**	**100%**

Bar scale: the line marks 100% of target; bars stop at 200%. 100% or more · 70–99% · below 70%

NRREP, Activity by Activity

Targets and achievements for the 22 activities of the National Rural and Renewable Energy Programme (budget head 30800104), funded by the Government of Nepal and development partners.

#	Programme / activity	Unit	Target	Achieved	Against target
1	Solar water Pumping for Irrigation and Drinking water	no.	200	**132**	**66%**
2	Institutional Solar and Solar rooftop System Installation	kW	10,000	**16,800**	**168%**
3	Electricity generation from mini grid project (Multiyear program)	kW	300	**286**	**95.3%**
4	DKTI related activities (solar energy promotion in rural and semi-urban areas)	no.	10	**7**	**70%**
5	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on solar	no.	4	**3**	**75%**
6	Electrification through mini hydro installation (SASEC project)	kW	1,000	**500**	**50%**
7	Electrification through pico, micro and mini hydro projects	kW	200	**193**	**96.5%**
8	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on community electrification	no.	10	**10**	**100%**
9	Technical Assistance for SASEC Projects	no.	5	**4**	**80%**
10	Promotion of Clean Cooking technologies under GCF	no.	200,000	**99,145**	**49.6%**
11	Clean Cooking Solutions Project Implementation Under GCF	no.	20	**20**	**100%**
12	Feasibility study, survey, design, supervision, quality assurance, training and capacity development on bio energy	no.	3	**3**	**100%**
13	Community and Institutional Biogas Plant	no.	10	**0**	**0%**
14	Nepal Mini-grid related activities	no.	10	**7**	**70%**
15	World Bank supported Nepal Mini grid related W2E, solar/mini and micro hydro development grant and loan	no.	8	**4**	**50%**
16	Carbon and climate change related activities	no.	4	**3**	**75%**
17	Third party monitoring of Household based RETS Power output verification and testing of micro/mini hydro projects	no.	4	**2**	**50%**
18	Environment and social safeguard	no.	3	**0**	**0%**
19	Study and research on various technologies related to green hydrogen	no.	1	**1**	**100%**
20	NRREP Management Expenditure	no.	10	**8**	**80%**
21	GESI related activities	no.	2	**2**	**100%**
22	Sustainable Energy Challenge Fund for promotion of RETs	no.	10	**17**	**170%**

Bar scale: the line marks 100% of target; bars stop at 200%. 100% or more · 70–99% · below 70%

Flashback in Pictures



Third International Conference on Climate Change and Renewable Energy, Tribhuvan University, Kathmandu, 2011



World Environment Day, Kathmandu, 2005



Micro Hydropower Project Management Training, Pokhara, Kaski, 2005



Refresher Training for Trainers on Improved Cooking Stoves, Rupandehi, 2005



Orientation for Financial Institutions on Solar Credit, Pokhara, 2005



Orientation Training for District-Level NGOs on RETs, 2006



With then Danish Ambassador to Nepal-Finn Thilsted, Tanahu

Flashback in Pictures



Asia Clean Energy Forum, ADB, Manila, 2025



Honour for Ramailo Cooperative at 150,000 biogas plants, Morang, 2006



Nepal delegation at the 16th IRENA Assembly



Solar PV training for engineers by AEPC, 2012



Inauguration of Budathok micro hydro project, 2013



Solar power project, Dhulikhel Hospital, Kavrepalanchok



Welcoming the AEPC team to their village, 2013



Executive Secretary of UNFCCC in a Nepali kitchen, Kathmandu, 2014



Micro hydro turbine



AEPC–GIZ agreement on the RERA Programme, Khumaltar



former hon. Minister Barsaman Pun on occasion of 23rd Anniversary



Foundation stone laying, Susta Mini-grid Project, Triveni Susta RM-5, Nawalparasi (West), October 2019



Inauguration of Susta Minigrid by then Rt. Hon. Chairperson of Rastriya Sabha Mr. Ganesh Prasad Timilsina

Flashback in Pictures



Hon. Minister's visit to solar irrigation pumping system, Bharatpur-22, Chitwan, 2026



Improved water mill demonstration site



Mud Improved cook stove



Solar wind hybrid system, Dhaubadi



Solar PV mini-grid, Kalang, Dolpa



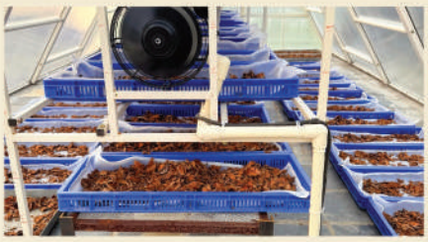
Village on a solar PV mini-grid, Dho, Dolpa



Solar irrigation pumping system



Disaster relief handover to Manang, 2021



Solar dryer



Induction cookstoves distribution to students, AEPC office, 2026

Flashback in Pictures



MoU between AEPC and KMC for rehabilitation of waste to energy plant at Teku, 2026



Grid interconnection of Sugarkhal Solar mini grid, Sugarkhal, Kailali



Solar rooftop PV, Saurabh Food



NEA and AEPC Sign Minutes to Connect Micro Hydro and Solar Mini-Grids to National Grid, 2026



Submission of concept note of Nepal Green Jobs Mission to Hon. Minister for Youth, Labour and Employment, 2026



Meeting with Hon. Chief Minister of Karnali Province, 2026



Energy efficiency activities with Tilganga Eye Hospital, 2021

Flashback in Pictures



Stakeholder consultation for the proposed Waste to Energy project to Green Climate Fund (GCF), 2026



Friendly futsal, AEPC Day 2021



Validation and Verification Body (VVB) during verification of ICS based carbon project



AEPC along with relevant stakeholders in final project monitoring and evaluation



Solar drinking water system



Biogas supervisor training



Clean cooking with household biogas

Flashback in Pictures



Electric vehicle rally, AEPC Silver Jubilee, 2021



AEPC visit to Hongshi Cement, 2021



POSTED closure workshop, Kathmandu, 2024



29th AEPC Day, Tahachal, Kathmandu



Asia Clean Energy Forum (ACEF), ADB, 2025



AEPC/NREP learning-sharing programme, 2025



Green hydrogen workshop, Kathmandu, 2026



International Clean Energy Day, Kathmandu, 2026



IRENA 16th Assembly, 2026



National forum on Carbon financing in energy projects, 2025

ANNEX 1

Major Policies, Strategies Laws and Plans

The policies, laws and plans that created AEPC, shaped its programmes and set its targets, 1996–2026. In the digital edition, click an underlined title to open the document.

Year	Policies, laws and plans	Type	What it meant for renewable energy and AEPC
1996 2053 BS	**AEPC Formation Order, 2053**	Order	Created AEPC on 3 November 1996 as the government's focal agency for renewable energy
2000 2057 BS	**Renewable Energy Subsidy Policy, 2057**	Policy	First national subsidy for rural renewable energy, delivered through private companies
2000	**Nepal Interim PV Quality Assurance (NIPQA)**	Standard	First solar quality standard; revised 2002, 2005, 2009, 2013, 2015
2006 2063 BS	**Rural Energy Policy, 2063**	Policy	Framework for rural energy access
2013	**CREF Operation Manual (amended 2021)**	Financing	Rules for the Central Renewable Energy Fund
2017	**Biomass Energy Strategy**	Strategy	Direction for biomass, cookstoves and bioenergy
2018 2075 BS	**Seventh Amendment to the Formation Order**	Order	Added energy efficiency, GCF accreditation, carbon and support to provinces and local governments
2018	**National Energy Efficiency Strategy**	Strategy	Double the efficiency improvement rate, from 0.84% to 1.68% a year, by 2030
2018	**AEPC GESI Policy**	Policy	Priority for women and disadvantaged groups
2018	**Environmental and Social Safeguards (ESS) Policy**	Policy	Safeguards for people and environment
2018	**MoEWRI White Paper**	Policy paper	Roadmap for energy, water resources and irrigation
2019 2076 BS	**National Climate Change Policy**	Policy	Mitigation, adaptation and climate and carbon finance
2021	**Long-Term Strategy for Net-Zero Emissions**	Strategy	Nepal's net-zero pathway, with clean energy at its centre
2021	**Grid-Connected Alternative Electricity Development Guideline**	Guideline	Rules for connecting solar and other alternative electricity to the grid
2022	**Renewable Energy Subsidy Policy; Subsidy Delivery Mechanism**	Policy	Current subsidy, including additional support for targeted groups
2022	**National Renewable Energy Framework**	Framework	Roles of federal, provincial and local governments
2024	**Energy Development Roadmap and Action Plan**	Roadmap	National energy roadmap and action plan
2024	**Green Hydrogen Policy**	Policy	Framework for green hydrogen as a new fuel
2025	**Solar Thermal Roadmap and Implementation Plan**	Roadmap	Solar thermal energy for homes, institutions and industry
2025	**Third Nationally Determined Contribution (NDC 3.0)**	Commitment	2035 targets incl. 2.1 million households cooking with electricity and 400 Municipal Energy Plans
2025	**NEPQA-2025**	Standard	Updated solar quality standard, in force from 8 October 2025
2026	**Financial Act, 2026**	Act	VAT and tax exemption for renewable energy systems
2026 2083 BS	**Renewable Energy and Energy Efficiency Bill, 2083**	Bill	Registered in Parliament; proposes a Renewable Energy and Energy Efficiency Center to replace AEPC. An earlier bill lapsed when the House was dissolved in 2025

Gold years = policies, laws and plans that created or reshaped AEPC. Underlined titles open public copies (AEPC, UNFCCC, Law Commission, ICIMOD, ADB, UNEP, ESMAP, AEE INTEC)

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ANNEX 2

Three Decades of Partnership

The countries, institutions and organisations that have partnered with AEPC over thirty years.

1 Partner countries

- Netherlands
- Germany
- Denmark
- Norway
- United Kingdom
- Japan
- United States
- Finland

2 Development banks and funds

- World Bank
- Asian Development Bank (ADB)
- European Union (EU)
- KfW Development Bank
- Green Climate Fund (GCF)
- Global Environment Facility (GEF)
- Global Development and South-South Cooperation Fund (GDF)

3 Development agencies and international organisations

- GIZ
- USAID
- Energising Development (EnDev)
- International Renewable Energy Agency (IRENA)
- Global Green Growth Institute (GGGI)
- International Centre for Integrated Mountain Development (ICIMOD)
- International Water Management Institute (IWMI)
- International Union for Conservation of Nature (IUCN)

4 Banks

- Agricultural Development Bank
- Nepal Investment Mega Bank
- Global IME Bank
- Himalayan Bank
- Laxmi Sunrise Bank
- Machhapuchchhre Bank
- Muktinath Bikas Bank
- Nabil Bank
- NMB Bank
- Prabhu Bank
- Sanima Bank
- Siddhartha Bank
- Standard Chartered

5 United Nations agencies

- United Nations Development Programme (UNDP)
- UN Capital Development Fund (UNCDF)
- UN Environment Programme (UNEP)
- UNICEF
- Food and Agriculture Organization (FAO)

6 NGOs, Organizations and Alliances

- SNV
- Practical Action
- Winrock International
- WWF
- Renewable World
- Clean Cooking Alliance (CCA)
- Wine to Water Nepal
- Centre for Rural Technology, Nepal (CRT/N)
- CARE Nepal
- Nepal Energy Foundation
- Biogas Sector Partnership Nepal (BSP-Nepal)
- Helvetas Nepal
- FRANKE
- BFIN

7 Education and research institutions

- Tribhuvan University, Institute of Engineering (Centre for Energy Studies)
- Kathmandu University
- Research Centre for Applied Science and Technology (RECAST), Tribhuvan University
- Nepal Academy of Science and Technology (NAST)
- Council for Technical Education and Vocational Training (CTEVT)
- Curriculum Development Centre (CDC)

8 Private Sector Associations

- Renewable Energy Confederation of Nepal (RECON)
- Solar Electric Manufacturers Association Nepal (SEMAN)
- Solar Power Producers Association Nepal (SOPPAN)
- Solar Thermal Association Nepal (STAN)
- Nepal Micro Hydropower Development Association (NMHDA)
- Water and Energy Consultants' Association Nepal (WECAN)
- Nepal Biogas Promotion Association (NBPA)
- Bioenergy Entrepreneurs' Association Nepal (BEAN)
- Rural Technology Producers' Association Nepal (RuTPAN)

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ANNEX 3

Acronyms

AEDB	Alternative Energy Development Board
AEPC	Alternative Energy Promotion Centre
BSP	Biogas Support Programme
CCS	Clean Cooking Solutions (GCF project)
CDM	Clean Development Mechanism
CREF	Central Renewable Energy Fund
DAE	Direct Access Entity
DKTI	Promotion of Solar Energy for Rural and Semi-Urban Regions (KfW)
EE	Energy Efficiency
ESAP	Energy Sector Assistance Programme
ESS	Environmental and Social Safeguards
GCF	Green Climate Fund
GEDSI	Gender Equality, Disability and Social Inclusion
GESI	Gender Equality and Social Inclusion
ICS	Improved Cookstove
IWM	Improved Water Mill
kW / kWp	kilowatt / kilowatt-peak
MEP	Municipal Energy Plan
MEPS	Minimum Energy Performance Standards
MGEAP	Mini Grid Energy Access Project
MHP	Micro Hydropower Project
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MuAN	Municipal Association of Nepal
NDC	Nationally Determined Contribution
NEPQA	Nepal Photovoltaic Quality Assurance
NREP	Nepal Renewable Energy Programme
NRREP	National Rural and Renewable Energy Programme
PEU	Productive Energy Use
REDP	Rural Energy Development Programme
REEE	Renewable Energy and Energy Efficiency
REEEC	Renewable Energy and Energy Efficiency Center
RERL	Renewable Energy for Rural Livelihood
RESCO	Renewable Energy Service Company
SASEC	South Asia Subregional Economic Cooperation
SECF	Sustainable Energy Challenge Fund
SHS	Solar Home System
SREP	Scaling Up Renewable Energy Program
VGF	Viability Gap Funding



ANNEX 4

The People of AEPC | Current Staff List

- **Nawa Raj Dhakal**
  Executive Director
- **Dr. Narayan Prasad Adhikari**
  Deputy Executive Director
- **Rudra Prasad Khanal**
  Director
- **Dr. Laxman Prasad Ghimire**
  Director
- **Tara Prasad Pokharel**
  Chief Account Comptroller
- **Madan KC**
  Deputy Director
- **Parbata Bhatta Adhikari**
  Deputy Director
- **Dr. Rana Bahadur Thapa**
  Deputy Director
- **Shubha Laxmi Shrestha**
  Deputy Director
- **Dr. Kundan Pokhrel Majagaiya**
  Deputy Director
- **Ishwar Chandra Khanal**
  Senior Officer
- **Santosh Rai**
  Senior Officer
- **Roshani Regmi**
  Senior Officer
- **Sundar Bahadur Khadka**
  Senior Officer
- **Pratima KC**
  Senior Officer
- **Chaitanya Prakash Chaudhary**
  Senior Officer
- **Lawa Kumar Thapa**
  Senior Officer
- **Prakash Bhandari**
  Senior Officer
- **Amanul Hak Ansari**
  Senior Officer
- **Krishna Prasad Panth**
  Account Officer
- **Sarmila Shrestha**
  Computer Officer
- **Sabita Aryal**
  Administrative Officer (7th)
- **Shrijana Pandey**
  Administrative Officer (7th)
- **Bibek Kafle**
  Engineer
- **Saroj Bahadur Karki**
  Technical Officer (7th)
- **Puskar Shrestha**
  Technical Officer (7th)
- **Kusum Deo**
  Engineer
- **Bhim Bahadur Tajpuriya**
  Engineer
- **Ramesh Thapa**
  Administrative Officer (6th)
- **Ganga AC**
  Administrative Officer (6th)
- **Khagendra KC**
  Technical Officer (6th)
- **Rajan Acharya**
  Technical Officer (6th)
- **Padma Poudel**
  Account Officer
- **Pradip Khatiwoda**
  Sub-Engineer
- **Bimal Prasad Bhusal**
  Senior Admin Assistant
- **Sumitra Devkota**
  Sub-Engineer
- **Nauneet Tiwari**
  Sub-Engineer
- **Anupriya Gautam**
  Sub-Engineer
- **Bibek Pokhrel**
  Senior Admin Assistant
- **Surya Syangtan**
  Driver
- **Lil Bahadur Moktan**
  Driver
- **Ratna Kumari Timilsina**
  Office Helper
- **Sishir Thapa Magar**
  Office Helper
- **Samjhana Dangol**
  Office Helper

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Photos

All photos are from the AEPC collection

Cover Image
Front: Solar mini grid, Dolpo Buddha Rural Municipality, Dolpa
Back: Solar mini grid lighting Dolpo Buddha Rural Municipality, Dolpa



“A first light, a smoke-free kitchen, water for the fields, energy for a workshop: thirty years of clean energy that reaches people where they live.”

YEARS OF CLEAN ENERGY
AEPC · 1996–2026

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