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

# Leveraging Investment in Sustainable Energy

## Achievements of Sustainable Energy Challenge Fund

NEPAL RENEWABLE ENERGY PROGRAMME
UKaid from the British people
जर्मन सहयोग DEUTSCHE ZUSAMMENARBEIT
KFW
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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**Photos**

All photos are from the AEPC collection.

Cover Image
Nepal's first-ever dual-axis sun-tracking agro-voltaic solar project, installed in Jhapa.

**Layout and Design**

Pragya Sagar Subedi

# ACKNOWLEDGEMENT

The Alternative Energy Promotion Centre acknowledges the support received from the REEEP-GREEN, funded by the German Federal Ministry of Economic Cooperation and Development (BMZ) and European Union (EU) and implemented by GIZ, in the preparation of this publication "Leveraging Investment in Sustainable Energy: Achievements of the Sustainable Energy Challenge Fund" along with mobilizing the expert, Mr. Prem Sagar Subedi, whose technical expertise, analytical rigor, and dedicated efforts were instrumental in documenting the achievements, lessons learned, and impacts of the SECF.

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AEPC is indebted to BEK, EU, BMZ and other development partners, all the project developers, private sectors, relevant partners and stakeholders who supported the implementation of SECF and shared information, experiences, and data that made this publication possible.

# Contents

# ACRONYMS

| | |
|---|---|
| **AEPC** | Alternative Energy Promotion Centre |
| **BEK** | British Embassy Kathmandu |
| **BFI** | Bank and Financial Institution |
| **CREF** | Central Renewable Energy Fund |
| **DDA** | Due Diligence Assessment |
| **DP** | Development Partner |
| **DSE** | Distributed Sustainable Energy |
| **EE** | Energy Efficiency |
| **EU** | European Union |
| **EV** | Electric Vehicle |
| **GCF** | Green Climate Fund |
| **GBP** | British Pound |
| **GoN** | Government of Nepal |
| **HH** | Household |
| **IC** | Investment Committee |
| **IEP** | Independent Evaluation Panel |
| **ISC** | Initial Screening Committee |
| **kWp** | Kilowatt Peak |
| **LFI** | Local Financial Institution |
| **LLG** | Loan Loss Guarantee |
| **LPG** | Liquefied Petroleum Gas |
| **MFI** | Micro Finance Institution |
| **MHP** | Micro Hydro Project |
| **MoEWRI** | Ministry of Energy Water Resources and Irrigation |
| **MSME** | Micro Small and Medium Enterprise |
| **MW** | Mega Watt |
| **NDC** | Nationally Determined Contribution |
| **NPR** | Nepalese Rupees |
| **NREP** | Nepal Renewable Energy Programme |
| **OM** | Operation Manual |
| **PBA** | Performance Based Agreement |
| **PPP** | Public Private Partnership |
| **PV** | Photo Voltaic |
| **RE** | Renewable Energy |
| **REEEP-GREEN** | Renewable Energy and Energy Efficiency Programme – Green Recovery and Empowerment with Energy in Nepal |
| **SECF** | Sustainable Energy Challenge Fund |
| **SDG** | Sustainable Development Goal |
| **SPV** | Special Purpose Vehicle |
| **TA** | Technical Assistance |
| **USD** | US Dollar |
| **VGF** | Viability Gap Funding |

# Message from Hon. Minister, Ministry of Energy, Water Resources and Irrigation

## Mr. Anil Kumar Sinha

Honorable Minister, Ministry of Energy, Water Resources and Irrigation, and

Chairperson, Alternative Energy Development Board

It gives me great pleasure to present my message for "Leveraging Investment in Sustainable Energy: Achievements of Sustainable Energy Challenge Fund". This publication is a timely reflection of Nepal's collective efforts to accelerate the transition towards clean, reliable and sustainable energy systems through innovative financing and strategic partnerships.

The Sustainable Energy Challenge Fund (SECF), incorporated within the Central Renewable Energy Fund (CREF) of Alternative Energy Promotion Centre (AEPC), has demonstrated how well-designed financial instruments can unlock private sector investment, bridge viability gaps and catalyse scalable solutions in renewable energy and energy efficiency. In a developing economy like Nepal, where access to affordable and sustainable energy is closely linked with economic growth, environmental protection and social equity are also essential to transform ambition into action.

This publication highlights not only successful projects and investments, but also the power of collaboration among government institutions, development partners, financial institutions and the private sector. It stands as strong evidence that when policy vision is aligned with innovative financing and market-based approaches, sustainable energy development can move forward with confidence and impact.

I commend the AEPC, CREF and SECF partners and all stakeholders involved for their dedication, professionalism and commitment to advancing Nepal's sustainable energy agenda. The achievements documented herein will serve as a valuable reference for policymakers, practitioners and investors, inspiring further innovation and investment in the clean energy sector.

As Nepal moves towards its national goals of energy security, energy transition and climate resilience, initiatives like SECF will continue to play a crucial role in mobilising resources, strengthening market confidence and ensuring inclusive and sustainable growth. I am confident that the lessons and successes highlighted in this report will inform future policies and programs supporting SECF's transition from the viability gap funding through public or development partners' funds to sustainable market based financing leveraging private capital and green finance.

I extend my sincere appreciation to everyone who contributed to making SECF a success and to those who worked diligently to compile this achievement report. May this publication encourage greater collaboration and investment in building a greener, more resilient and prosperous Nepal.

Best wishes for the continued success of SECF and all sustainable energy initiatives in the country.

# Message from Secretary, Ministry of Energy, Water Resources and Irrigation


## Mr. Chiranjeewee Chataut

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

Member, Alternative Energy
Development Board


The Sustainable Energy Challenge Fund (SECF) has played a pivotal role in demonstrating how targeted financial instruments can address market barriers, reduce investment risks and stimulate private sector participation in renewable energy and energy efficiency projects. By bridging the viability gap and encouraging innovation, SECF has contributed significantly to strengthening Nepal's clean energy market ecosystem.

This publication is not only a record of achievements, but also a learning platform that showcases how coordinated efforts among government agencies, development partners (DPs), financial institutions and the private sector can translate policy objectives into tangible outcomes. The experiences and best practices documented herein will be highly valuable in guiding future programs and refining policies to further enhance sustainable energy investments in Nepal.

I would like to commend the Alternative Energy Promotion Centre (AEPC), Central Renewable Energy Fund (CREF), SECF team, DPs, project developers and all implementing stakeholders for their professionalism, commitment and tireless efforts in successfully operationalising SECF. Their work reflects the Ministry's broader vision of accelerating the energy transition, enhancing energy security and contributing to Nepal's climate commitments. For the sustainability of SECF, it is necessary to explore and enhance the modalities for shifting from the viability gap funding through public or DPs' funds to the market based financing leveraging private capital and green finance.

As we move forward, the Ministry remains committed to fostering an enabling policy and regulatory environment that supports innovative financing, encourages private investment, and ensures sustainable and inclusive energy development. I am confident that the insights from this report will inspire continued collaboration and help scale up impactful interventions across the energy sector.

I sincerely appreciate all the partners and stakeholders who contributed to the success of SECF and to the preparation of this achievement report. May this publication serve as a strong foundation for future initiatives and inspire greater momentum in leveraging the investments for sustainable energy in Nepal.

# Message from CREF Investment Committee

## Sandip Kumar Dev

Joint Secretary, Ministry of Energy, Water Resources and Irrigation, and

Chairperson, Investment Committee, Central Renewable Energy Fund

Since the incorporation of Sustainable Energy Challenge Fund (SECF) in 2021 within the Central Renewable Energy Fund (CREF), SECF has made remarkable progress in a very short period of time. Through its eight windows of support, SECF has successfully supported 136 projects and mobilised an investment volume of approximately USD 26.8 million, with the leverage ratio of SECF fund to private and public sector investments is 1:3.3. These achievements clearly demonstrate the effectiveness of SECF in catalysing private sector participation, reducing investment risks and bridging the viability gap in renewable energy and energy efficiency projects.

As the Chairperson of Investment Committee of CREF, I have witnessed how SECF has evolved into a dynamic and credible financing instrument that promotes innovation, market confidence and scalability. The diversity of supported projects reflects SECF's flexibility and responsiveness to market needs, while maintaining transparency, accountability and technical rigor in project selection and implementation.

This report not only documents quantitative achievements, but also highlights the qualitative impact of SECF in strengthening Nepal's clean energy ecosystem. It shows how collaboration among government institutions, development partners, financial institutions and private sector actors can translate policy aspirations into tangible and sustainable outcomes.

I would like to express my sincere appreciation to the Alternative Energy Promotion Centre (AEPC), CREF Investment Committee Members, CREF/SECF team, development partners, project developers and all stakeholders who have contributed to making the SECF a success. Their dedication and professionalism have been instrumental in positioning SECF as a model mechanism for leveraging investments in sustainable energy.

Looking ahead, I am confident that SECF will continue to expand its impact by supporting more innovative projects, mobilising greater levels of private investment and contributing significantly to Nepal's goals of energy transition, energy security and climate resilience. The experiences and lessons captured in this report will be invaluable in guiding future initiatives and strengthening sustainable finance frameworks in the country.

I extend my best wishes for the continued success of CREF/SECF and hope that this publication will inspire greater confidence and engagement among investors, policymakers and practitioners working towards a greener and sustainable Nepal.

# Message from Alternative Energy Promotion Centre


## Nawa Raj Dhakal

Executive Director

Alternative Energy Promotion Centre


It is with great pride and satisfaction that I present this message for the book "Leveraging Investment in Sustainable Energy: Achievements of Sustainable Energy Challenge Fund". This publication reflects a significant milestone in Alternative Energy Promotion Centre (AEPC)'s continued efforts to promote market-driven, private sector-led growth in Nepal's renewable energy and energy efficiency sectors.

The incorporation of Sustainable Energy Challenge Fund (SECF) under the Central Renewable Energy Fund (CREF) has introduced Viability Gap Funding (VGF)-support to Distributed Sustainable Energy (DSE) projects as a practical and effective financing mechanism in Nepal. SECF addresses critical financial and market barriers faced by project developers, making DSE projects viable, bankable and scalable. Through its eight windows of support, SECF has created new opportunities for private enterprises, unlocked investments from the financial sector and fostered innovation by reaching underserved and emerging areas. Since 2021, SECF has supported more than 136 projects across Nepal, translating national policies into real impact on the ground.

I acknowledge the British Embassy Kathmandu for its instrumental support in designing and operationalising SECF through the UKAid-supported Nepal Renewable Energy Programme (NREP), under the auspices of Climate Smart Development Programme. I also extend my appreciation to the German Federal Ministry of Economic Cooperation and Development (BMZ) and European Union for their support to SECF through GIZ/REEEP-GREEN, and the German Development Bank (KFW) for their support in scaling up SECF initiatives and promoting private sector investment in DSE.

I sincerely appreciate the guidance and cooperation from Ministry of Energy, Water Resources and Irrigation, Alternative Energy Development Board and CREF Investment Committee. My heartfelt thanks go to the project developers, financial institutions, entire team of AEPC and CREF, as well as our implementation partners DAI Global UK-Winrock International consortium, for their dedication and professionalism in making the SECF a success.

This book presents background and key achievements of SECF. I believe it will serve as a valuable reference for policymakers, investors, project developers, practitioners and development partners. As Nepal moves towards a green, sustainable and resilient energy future, SECF stands as a model of how smart financing and strong partnerships can accelerate sustainable energy development. I warmly invite more partners to join hands with AEPC for the scaling up and proliferation of SECF support to DSE projects across the country.

# Message from British Embassy Kathmandu


## Pippa Bird

Development Director and
Deputy Ambassador, Nepal

British Embassy, Kathmandu


The Sustainable Energy Challenge Fund (SECF) shows what is possible when innovation, collaboration, and commitment come together to drive real change. SECF has transformed how government and the private sector work together - expanding access to clean, reliable energy in Nepal while saving taxpayer money. It has done this by catalysing new technologies, removing delivery barriers, and strengthening markets through a private sector–led approach. The UK Government is proud to have supported this pioneering initiative from the start, in close partnership with the Government of Nepal's Alternative Energy Promotion Centre (AEPC).

Such progress requires a shift in mindset - embracing innovation, taking calculated risks, and building new partnerships with the private sector. SECF has reduced market-entry risks for companies, helping them introduce innovative, scalable technologies and business models. By improving financial institutions' understanding of the renewable energy market, SECF has enabled tailored loan products for clean energy businesses and consumers. This has unlocked domestic financing and shown how modest, targeted public support can leverage private investment and help businesses grow while delivering quality, reliable energy services.

The benefits of SECF are evident across industries, small and micro enterprises, and households, including in disadvantaged and remote areas. Crucially, SECF shows how effective collaboration between federal, provincial, and local governments can extend energy access to rural and hard to reach communities, ensuring no one is left behind.

I sincerely thank AEPC for its leadership in establishing and running the Sustainable Energy Challenge Fund, and I hope government continues to prioritise this important initiative. We are grateful to GIZ and the European Union for placing their trust in the SECF mechanism and for their valuable contributions, which have strengthened the Fund's impact. I also extend my appreciation to my team at the British Embassy and the programme team. Together, we have shown that strategic partnerships and innovative financing can deliver lasting change, build stronger markets, and expand access to clean, reliable energy for all.

The achievements of SECF are not just milestones, they are the foundations of Nepal's sustainable future.

# Message from EU Delegation to Nepal


## Jose Luis VINUESA-SANTAMARIA

Head of Cooperation,

EU Delegation to Nepal


This report on "Achievement of Sustainable Energy Challenge Fund (SECF)" outlines how public finance can be used strategically to mobilise private sector investment and strengthen domestic energy markets for a greener future.

The European Union (EU) congratulates AEPC on the successful achievements of SECF and thanks to AEPC and Government of Nepal for their leadership in advancing innovative, market-based solutions for sustainable energy development. The EU is pleased to note that the EU/Germany co-funded REEEP-GREEN programme is a part in supporting a just green transition through SECF by enabling clean energy technologies, reducing fossil fuel import, and promoting inclusive green growth. The SECF is one of the means to support Nepal's effort in its journey towards a sustainable energy solution, and a witness to the strong partnership between the Government of Nepal, the European Union and the German Government. Most importantly, it is aligned with the EU's Global Gateway strategy that aims to mobilise EUR 300 billion to narrow down the global investment gap by leveraging EU grants to de-risk energy project investments, making projects viable to attract private sector investment. The SECF incentivizes innovation, entrepreneurship, and de-risk clean energy projects by leveraging public resources to attract private capital for off- grid and distributed renewable energy, including solar rooftops, mini-grids, clean cooking technologies, and electric mobility, advancing Nepal's transition toward a low-carbon, green, resilient, and inclusive energy sector.

The SECF is acting as a catalyst for the promotion of clean energy technologies. It adopts innovative business models and technologies to expand access to modern energy services, promote energy generation mix and energy transition and contribute to Nepal's long-term energy security and climate goals in line with the White Paper of the Government of Nepal. Further, it strengthens partnerships with development partners to secure additional funding for the project financing, achieving Nepal's NDC 3.0 targets, the Sustainable Development Goals (SDGs), mainly SDG 7 while also generating co-benefits across SDG 8, SDG 9, SDG 12 and SDG 13, Energy Development Roadmap 2081, including Public Private Partnership.

This report will be useful for the readers to understand the SECF's application and selection processes, including analyses of its challenges, lessons, and key achievements. It also proposes a sustainable plan to strengthen renewable energy financing initiatives through the SECF mechanism. The EU looks forward that this resource is useful for the remaining local governments to replicate this model in order to leveraging public resources to create an enabling environment for the private sector to introduce innovative technologies and business models for off-grid and other renewable energy solutions for the people of Nepal.

I wish again to extend my sincere gratitude to AEPC, Government of Nepal, Development Partners, especially Germany and the United Kingdom, the private sector, as well as the GIZ, for their dedication in developing and successful implementing of the Sustainable Energy Challenge Fund.

# Message from KfW Nepal

## Niraj Subedi

Country Representative

KfW

Nepal has made remarkable progress in promoting renewable energy over the past decades. While blanket subsidies were instrumental in the early years when renewable energy use was limited, the country's success has created the need for more targeted and innovative approaches. The Sustainable Energy Challenge Fund (SECF) has demonstrated that alternatives to traditional subsidies can effectively catalyse novel ideas and advanced applications of renewable energy, taking the sector to the next level. The success of SECF in recent years has inspired a rethinking of conventional subsidy policies. I extend my sincere appreciation to the British Embassy, the European Union, GIZ, AEPC and MoEWRI for their partnership in establishing and implementing this transformative mechanism to advance sustainable energy solutions in Nepal.

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# Message from GIZ Nepal


## Paulina Campos

Country Representative
Nepal • Sri Lanka • Maldives

Deutsche Gesellschaft fuer
Internationale Zusammenarbeit (GIZ) GmbH
Kathmandu, Nepal


The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is honored to be a strategic partner of the Alternative Energy Promotion Centre (AEPC) and the Government of Nepal in advancing the country's sustainable energy transition through the Sustainable Energy Challenge Fund (SECF), implemented under the Central Renewable Energy Fund (CREF).

SECF marks an important evolution in Nepal's renewable energy financing framework. By introducing a transparent, competitive, and performance-based Viability Gap Funding (VGF) mechanism, SECF has demonstrated how public resources can be used strategically to leverage private capital, address market barriers, and accelerate the deployment of distributed sustainable energy solutions. The strong market response and the scale of investments mobilised under SECF clearly reflect growing private sector confidence in Nepal's clean energy sector.

Through GIZ's support under the Renewable Energy and Energy Efficiency – Green Recovery and Empowerment with Energy in Nepal (REEEP-GREEN) programme, co-financed by the European Union, SECF has been further strengthened as a catalytic instrument for market development. GIZ's engagement has focused on reinforcing market-oriented approaches, promoting innovation, and supporting scalable and inclusive business models that align with Nepal's long-term energy and climate objectives.

The achievements documented in this report highlight SECF's tangible contribution to transforming energy delivery across households, enterprises, and communities. SECF supported interventions have enabled the expansion of rooftop solar PV systems, accelerated the adoption of electric cooking, strengthened early electric mobility infrastructure, and improved the sustainability of micro-hydro projects through system upgrades and grid integration. These results contribute directly to enhanced energy security, reduced dependence on imported fossil fuels, improved air quality, and lower greenhouse gas emissions.

Equally important is SECF's role in shifting the distributed energy sector from conventional subsidy-based approaches toward market-driven financing. By engaging banks, financial institutions, microfinance providers, and private developers, SECF has helped establish distributed sustainable energy as a credible and bankable investment opportunity. Innovative models such as Renewable Energy Service Companies (RESCOs), demand aggregation through financial institutions, and performance-based incentives have positioned SECF as a learning and demonstration platform for future clean energy financing mechanisms in Nepal.

SECF's outcomes are well aligned with national priorities, including Nepal's Nationally Determined Contribution (NDC 3.0), the Energy Development Roadmap, and the broader objectives of green growth and energy transition. The fund's emphasis on gender and social inclusion, local economic development, and job creation further strengthens its contribution to inclusive and sustainable development.

GIZ commends AEPC for its leadership in institutionalising SECF within CREF and for successfully managing a government-led challenge fund that delivers measurable results on the ground. The partnership between AEPC, development partners, financial institutions, and the private sector under SECF provides a strong foundation for scaling up blended finance approaches in Nepal's energy sector.

GIZ remains committed to continuing its close cooperation with AEPC and the Government of Nepal to strengthen enabling frameworks, deepen private sector participation, and support innovative financing solutions that accelerate Nepal's transition toward a resilient, low-carbon, and inclusive energy system.

# Sustainable Energy Challenge Fund

SECF was started in

**May 2021** and implemented by Alternative Energy Promotion Centre through Central Renewable Energy Fund.

**British Embassy** in Kathmandu supported GBP 5.5 million and.

**REEEP-GREEN** supported Euro 800,000.

**262,401 People** now have access to improved clean energy;

**136 projects** benefited.

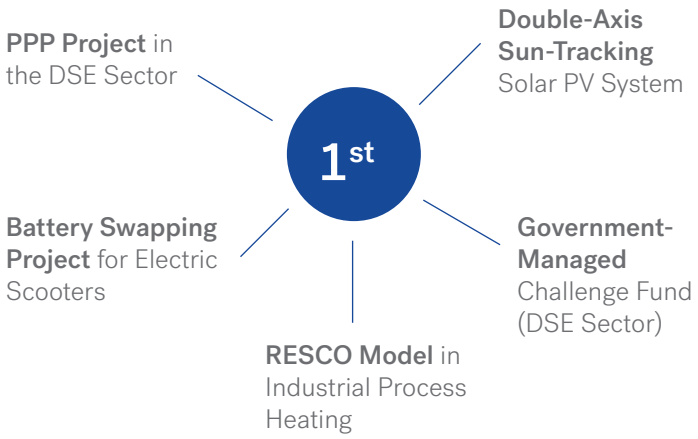
The projects under SECF are expected to result in an estimated **48,071 $tCO_2e$** reduction in GHG emissions.

## Major Achievements

### Catalysed Investments

| | |
|---|---|
| **SECF** | NPR 884,413,859 |
| **Private Investment** | NPR 2,737,537,674 |
| **Public Investment** | NPR 215,859,012 |
| **Investment Leverage** | 1:3.3 |

### Fostered Innovations




### Transformed Energy Delivery

**26.1 MWp**
Rooftop and Captive Solar Projects installed

**132**
EV Charging Stations installed

**47,274**
Electric Cook Stoves installed

**189**
Electric Water Pumps installed; including 129 solar powered pumps

**360**
Electric Rickshaws promoted

**227**
Institutions and MSMEs benefitted from clean energy projects including fuel switching

**4**
Micro Hydro Projects connected to national grid

### Strengthened Partnerships

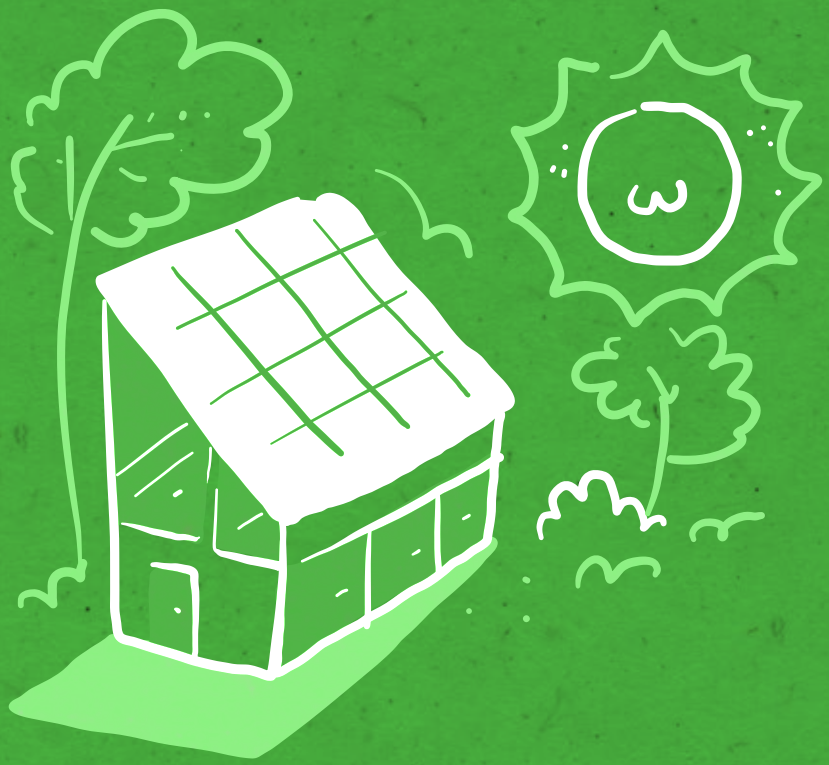
Partnered with energy companies and project developers, financial institutions, and Local and Provincial Governments.

IN PHOTO

*SECF Promoted Solar Irrigation Project*

# 1

# Introduction



# 1 Introduction

## 1.1 Background

Globally, challenge funds and viability gap funding (VGF) emerged as development finance instruments to address market failures that prevent commercially promising but high-risk projects from attracting private investment. Originating in the 1990s through UK development practice and later adopted widely by bilateral and multilateral development partner (DPs), challenge funds introduced competitive and performance-based grants that share risk, incentivise innovation, and leverage private capital. In the renewable energy and energy efficiency sectors, characterised by high upfront costs, long payback periods, and perceived technology risks; VGF and challenge funds became integral to blended finance approaches, helping bridge the gap between project costs and expected revenues. These mechanisms have gained traction since 2000s and been mainstreamed globally within Public Private Partnership (PPP) frameworks, climate finance facilities, and DP-supported clean energy programs to accelerate energy transition while ensuring value for public money. For example, in India, a national VGF scheme supports renewable infrastructure projects developed via PPP, reducing the financial gap and accelerating deployment.

IN PHOTO

*Rooftop Solar Project at Bhudeo Khadya Udhyog, Dhanusa*

In Nepal, since 2013/14, policies and plans emphasised private sector participation, PPP, and risk-sharing in infrastructure and energy. The operationalisation of challenge fund–based VGF in renewable energy took concrete shape only in the early 2020s. Ministry of Energy, Water Resources, and Irrigation (MoEWRI) issued a comprehensive White Paper, 2018 with strategic vision for transforming Nepal's energy landscape, emphasising energy security, diversification of the energy mix, and integration of renewable energy sources into the national grid.

The White Paper recognised that Nepal's abundant renewable resources like solar, wind, biomass, and micro-hydro remained largely underutilised due to limited financing mechanisms, inadequate private sector participation, and technological gaps. It called for innovative approaches to mobilise private investment and promote market-based solutions to accelerate renewable energy development.

To address these barriers, the White Paper proposed the establishment of mechanisms such as a challenge fund to incentivise innovation, entrepreneurship, and risk-sharing in clean energy ventures. It envisioned leveraging public resources to attract private capital for off-grid and distributed renewable energy systems, including solar rooftops, mini-grids, clean cooking technologies, and electric mobility. This approach was intended to expand access to modern energy services, promote energy generation mix and energy transition and contribute to Nepal's long-term energy security and climate goals.

In alignment with the Government of Nepal's (GoN) policy priorities, Alternative Energy promotion Centre (AEPC) took a proactive step by establishing the Sustainable Energy Challenge Fund (SECF), a viability gap–based financing mechanism incorporated within Central Renewable Energy Fund (CREF). The SECF was conceptualised to address financing barriers faced by near-commercial Distributed Sustainable Energy (DSE) projects, thereby enhancing their bankability and attracting greater private

sector participation. Subsequently, the CREF Operational Manual (OM) was amended to incorporate dedicated provisions for SECF, including eligibility criteria, funding modalities, support ceilings, and implementation procedures.

This report on "Leveraging Investments in Sustainable Energy: Achievements of Sustainable Energy Challenge Fund" captures design, implementation, outcomes of SECF, and way forward for the future.

## 1.2 Alternative Energy Promotion Centre

Established on November 3, 1996, AEPC is the government institution mandated on renewable energy, energy efficiency, climate change, and carbon mitigation activities. It is under the purview of MoEWRI. AEPC is the Nepal's first accredited Direct Access Entity to the Green Climate Fund (GCF). It is governed by an eleven-member board comprising representatives from the government, finance sector, private sector and civil society organisation.

The mission of AEPC is to make renewable energy and energy efficiency mainstream resource through energy accessibility, knowledge and adaptability contributing towards improved living conditions of people of Nepal and combatting climate change. The focus is to make AEPC recognised as an active institution promoting renewable energy and energy efficiency along with climate and carbon finance activities in the region.

## 1.3 Central Renewable Energy Fund

CREF is a financial mechanism of AEPC to promote investment in Nepal's sustainable energy sector. It serves as a vehicle for managing subsidies, concessional credit, and results-based financing to expand access to modern, clean, and sustainable energy across the country. The objective of CREF is to manage and to disburse subsidies, viability gap funding and debt along with utilisation and management of financial resources from GoN and DPs including carbon income. By mobilising both public and private financing, it plays a crucial role in bridging the affordability gap for households and communities, and feasibility gaps for enterprises supplying or adopting renewable energy technologies or services.

The CREF operates through a handling bank and partner banks mobilising subsidies, viability gap funding and concessional loans to project developers and end-users.

The operational costs of CREF are covered through its own earnings, primarily the interest generated from its deposits in banks. In addition to the annual audit conducted by the Office of the Auditor General and internal audit from Financial Controller General's office, CREF also carries out regular audits for development partner–supported funds through independent third-party to ensure transparency, compliance and accountability for the resources it mobilises.

Over time, CREF has evolved from a subsidy management system into a comprehensive blended finance platform, integrating grants, soft loans, and viability gap funding to make sustainable energy projects viable and sustainable.

> The **Handling Bank** is a financial institution with the main responsibility for overall management of funds under the CREF financial mechanism.

**Partner Banks** shall be responsible for credit lending to meet the objectives of CREF, and the amounts paid out to the renewable energy project developers or persons as credit shall be mobilised through these banks. Risks related to lending shall be borne by these partner banks on the basis of the agreement made.

> **Distributed Sustainable Energy** refers to distributed renewable energy and energy efficiency projects for social or economic development or clean energy access, that include (a) the generation, storage and use of distributed clean renewable energy for commercial, institutional, industrial and energy access purposes, (b) energy efficiency, and (c) in the case of cooking and transport, will also include the use of grid electricity for cooking and mobility.

**Viability Gap Funding** is a form of financial support provided by the government to make economically justified but financially unviable projects attractive to private investors.

## 1.4 Sustainable Energy Challenge Fund

SECF is a VGF-based financing mechanism incorporated within CREF. It became operational with the approval of CREF OM on May 9, 2021. The SECF was primarily conceptualised and operationalised with the support of the UK government through British Embassy Kathmandu (BEK) under the Nepal Renewable Energy Programme (NREP). Later, GIZ/REEEP-GREEN (a collaborative project of GoN, BMZ and EU) partnered with AEPC to utilise the mechanism to channel additional funds through the SECF mechanism to strengthen private sector participation and innovation in Nepal's sustainable energy sector. KfW Development Bank also joined SECF to support solar rooftop projects under German Climate Technology Initiative DKTI Solar Project.

BEK supported the SECF funding of GBP 5.5 million (USD 7.43 Million). In its first phase, GIZ, through the REEEP-GREEN project, mobilised an additional EUR 800,000 (USD 941,731), and this support continues till December 31, 2025[1].

The incorporation of the SECF within CREF represents a strategic step toward attracting larger private investments and scaling up DSE solutions in Nepal.

Through this approach, AEPC aims to make DSE projects more bankable, particularly those that extend modern energy services—such as lighting, clean cooking, powering appliances and productive applications—to underserved communities and commercial enterprises. This also contributes to improved quality and reliability of energy services and supports the adoption of sustainable energy solutions and energy transition across industry, business, service and transport sectors.

## 1.5 Nepal Renewable Energy Programme

NREP is a Government of Nepal programme funded by the UK Government through the BEK, implemented by AEPC, with Technical Assistance (TA) from a consortium led by DAI Global UK and including Winrock International. NREP was designed by Climate Smart Development Programme in May 2017 with Component 2: Renewable Energy.

NREP aimed to bring about transformational change in DSE development in Nepal through increased private investment, resulting in low-carbon economic growth and sustainable energy access for all. Specifically, NREP worked to increase private sector investment in developing and utilising DSE systems primarily in the commercial, institutional, and industrial sectors and to contribute to attain universal access to modern energy.

NREP was designed to achieve two outcomes and five outputs as below:

**Outcome 1**: Enabling environment established for increased Renewable Energy (RE) investment in Nepal as part of the overall energy plans

- Output 1.1: High quality evidence generated for governments, private sector and relevant stakeholders for developing policies, making investment for market-based development of distributed sustainable energy sector
- Output 1.2: Strengthened institutional capacity of national and sub-national governments; private sector and financial institutions on market-based development of distributed sustainable energy sector
- Output 1.3: Developed national and sub-national level Acts, policies, regulation, guidelines, mechanisms, plans, strategies, proposals and market instruments which include private sector (national and international) and climate fund investment provisions

1 Exchange rate of December 31, 2025, as per the Nepal Rastra Bank are used throughout the report. Exchange rates on that date are 1 USD = NPR 143.37; 1 GBP = NPR 193.79 and 1 EURO = NPR 168.77.

**Outcome 2**: RE investments significantly scaled up by financial institutions and the private sector resulting in rapid expansion of access to sustainable energy services in Nepal, contributing to inclusive, low carbon economic growth and sustainable energy access for all

- Output 2.1: Developed viable and sustainable distributed sustainable energy projects with focus in service delivery model for inclusive low carbon economic growth and sustainable energy access for all
- Output 2.2: Increased electric cooking, electric transportation and other electric and renewable energy appliances through distributed sustainable energy generation

NREP mobilised significant private sector investment in DSE through the VGF mechanism, with VGF support through SECF to the private sector. The programme also helped diversify energy supply sources and improve electricity reliability in the industrial and service sectors. Furthermore, it created demand for DSE, encouraged active participation from banks and financial institutions in DSE financing, and contributed to diversifying the energy mix, reducing fossil fuel use, empowering women, creating jobs, and lowering GHG emissions.

NREP began implementation in February 2019. TA component successfully completed in March 2025 while the Financial Assistance will close in March 2026. NREP resulted significant outcomes despite many challenges. The programme made a significant contribution to the DSE sector in Nepal by supporting AEPC in establishing and operationalising the pioneering SECF.

IN PHOTO

*EV Charging Station at Dhangadhi, Kailali*

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

Renewable Energy and Energy Efficiency Programme – Green Recovery and Empowerment with Energy in Nepal (REEEP-GREEN) is a technical cooperation programme agreed upon between the Government of Nepal, European Union (EU) and the Federal Republic of Germany. With the support of GIZ, on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), and co-financed by the EU, REEEP-GREEN is executed by the MoEWRI. The project aims to improve the preconditions for planning and implementing measures that promote renewable energy and the efficient use of energy in Nepal.

The main objective of REEEP-GREEN is to create the regulatory, institutional, and private-sector conditions necessary for disseminating renewable energy and improving energy efficiency in Nepal.

**The programme adopts a multi-level approach consisting of Five output areas:**

1. Policy, Institutional, and Regulatory Framework for Renewable Energy (RE) and Energy Efficiency (EE) at the national level;
2. Institutional Frameworks for RE and EE at sub-national levels;
3. Sustainable Market Development for RE and EE;
4. Distribution of Climate-Friendly Technologies; and
5. Energy Efficiency in Industries and Enterprises.

**The project focuses on:**

- Improving the institutional and regulatory framework for RE and EE promotion at the national level;
- Establishing the institutional structures needed for participatory RE and EE promotion at the sub-national level;
- Strengthening the private sector's capacity for developing the RE market and implementing EE technologies and services; and
- Anchoring knowledge dissemination, capacity-building support and upskilling, consultancy, and exchange of experiences within partner institutions.

REEEP-GREEN also supported SECF to increase private sector investment in developing DSE markets in Nepal.

IN PHOTO

*Portable Solar Irrigation Project Promoted through SECF*

IN PHOTO

*Grid Connected Jhumsa Khola, MHP, Palpa*

2

# Sustainable Energy Challenge Fund

# 2 Sustainable Energy Challenge Fund

## 2.1 Introduction

SECF is an innovative VGF mechanism incorporated within the CREF, a financial mechanism of AEPC. SECF provides targeted financial assistance to private sector led or PPP based DSE projects across Nepal that face proven viability gaps. The fund is designed to bridge these gaps, ensuring the financial viability, bankability, and long-term sustainability of such projects. The fund follows performance-based agreement and result-based payment. The fund supports DSE technologies within AEPC's mandate.

IN PHOTO

*EV Charging Station at Simalchaur, Pokhara*

SECF operates as a catalytic instrument to mobilise private sector investment in the renewable and sustainable energy market. It provides VGF to leverage private equity and credit from BFIs by de-risking early-stage and capital-intensive investments. By partially absorbing the initial investment risks, SECF encourages the private sector to enter markets that would otherwise be perceived as financially unattractive or uncertain. The mechanism also offers performance-based incentives for innovative business models that demonstrate strong potential for replication, scalability, and long-term impact.

Projects are selected through a transparent and online application process under different windows, which invite proposals from business entities (private companies, public companies and cooperatives) and under the public-private partnership modality. The SECF applicants need to demonstrate that SECF support helps their project become viable and sustainable. Business models should be attractive for investors and financiers. In doing so, SECF not only strengthens investor confidence but also contributes to the gradual transformation of Nepal's DSE market from subsidy dependency toward market-driven financing and innovation.

Through SECF, AEPC aims to systematically de-risk private sector participation by facilitating access to commercial or low-interest credit and providing VGF in cases where a clear viability gap exists. The SECF also encourages aggregation of small-scale renewable energy technologies such as solar water pumps, solar photo voltaic (PV) systems and clean cooking solutions into scalable and financially attractive investment portfolios for companies, cooperatives or micro finance institutions providing DSE systems or services. This approach helps to expand last-mile access to clean, reliable, and affordable energy for households, communities, and enterprises.

The SECF model, with its transparent online application process, independent evaluation and performance-based funding approach, demonstrated a paradigm shift approach in deployment of Nepal's DSE sector. It showcased how innovative financial

instruments can stimulate private sector participation, enhance energy access, promote clean technologies, and contribute to Nepal's broader goals of green growth, climate resilience, and sustainable development.

## 2.2 Guiding Principles of SECF

SECF operates under the eight guiding principles and practices.

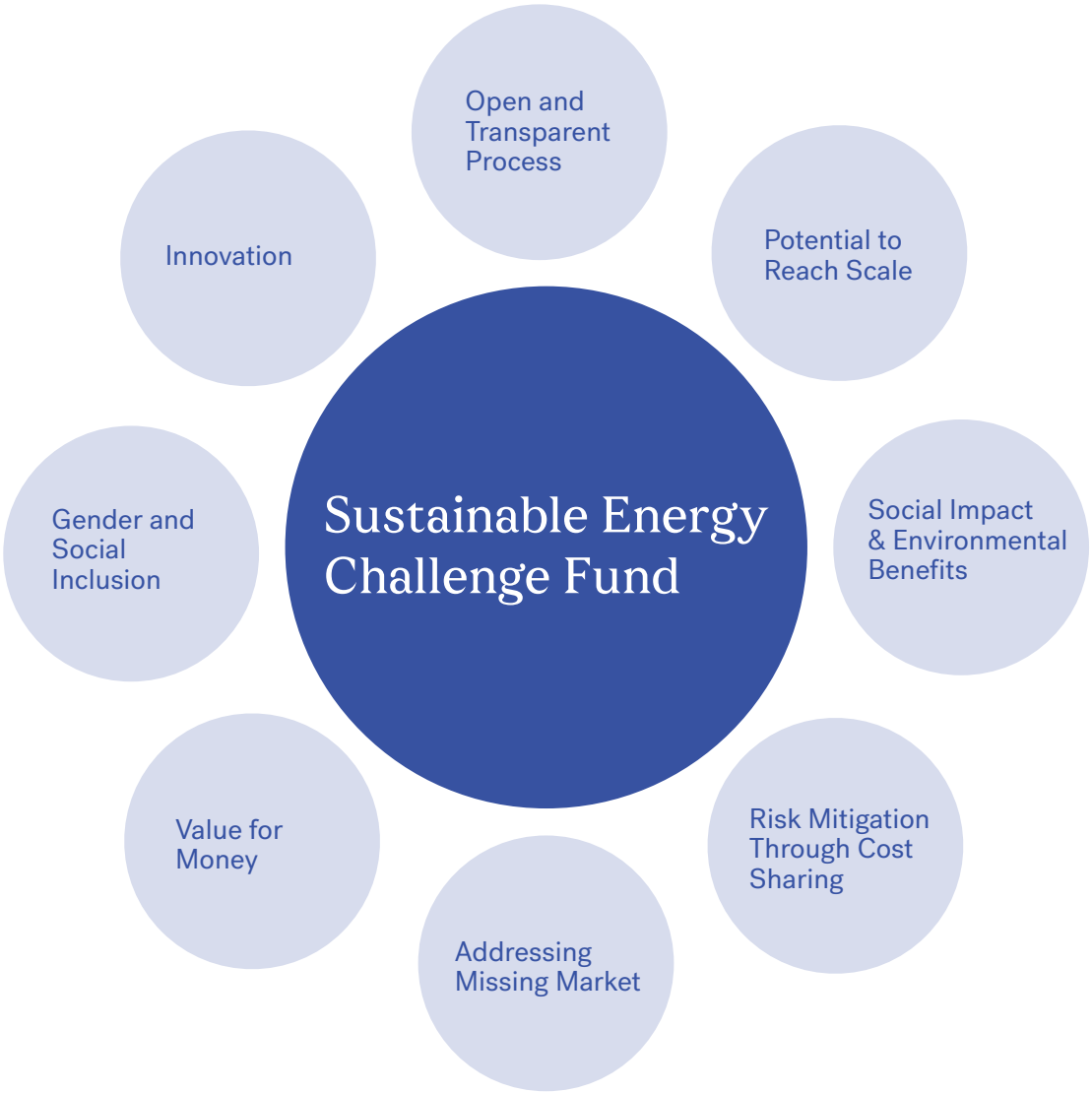



*Figure 1: Guiding Principles of SECF*

# Guiding principles of SECF

## i. Open & Transparent Selection Process

SECF uses an open and transparent process to select projects. This ensures that support goes to the most promising ideas and capable partners who can deliver real impact on the ground.

## ii. Potential to Reach Scale

Projects supported by SECF are assessed for their ability to grow beyond pilots. The fund prioritises solutions that can be expanded or replicated to benefit more households, communities, and enterprises across Nepal. As SECF primarily supports DSE companies in delivering energy services, achieving scale is essential for ensuring their long-term sustainability.

## iii. Social Impact and Environmental Benefits

Every SECF investment aims to deliver meaningful social outcomes, such as improved livelihoods or access to clean energy, while also contributing to reduced emissions and a healthier environment.

## iv. Risk Mitigation through Cost Sharing

SECF shares risks with the private sector by providing partial support, encouraging investment in areas that may otherwise be considered too risky. This partnership approach helps unlock new opportunities for clean energy solutions.

## v. Addressing Missing Markets

Many promising technologies struggle due to gaps in financing, supply chains, or consumer awareness. SECF steps in to bridge these gaps so that clean energy products and services can thrive in underserved markets.

## vi. Value for Money

The fund ensures that every rupee invested generates maximum impact. This means selecting interventions that deliver strong benefits relative to their cost, strengthening accountability and efficiency.

## vii. Gender and Social Inclusion

SECF places strong emphasis on reaching women, marginalised groups, and remote communities. Projects are encouraged to be inclusive by design, ensuring equitable access to clean and affordable energy.

## viii. Innovation

Innovation lies at the heart of SECF. The fund supports new ideas, business models, and technologies that can transform the clean energy landscape and inspire broader adoption across Nepal.

## 2.3 Governance Structure of SECF

The CREF OM is the governing document for SECF. On top of CREF's regular functions, two additional structures (namely, initial screening committee and independent evaluation panel) are added exclusively for evaluation of concept notes and full applications submitted for SECF support.

The **Initial Screening Committee (ISC)** is responsible for the preliminary evaluation of concept notes submitted by applicants. It conducts a thorough review to ensure that the proposed projects meet the eligibility criteria, align with the objectives of SECF, and demonstrate potential for impact. Based on this assessment, the ISC shortlists projects that are suitable for the development of full applications.

The **Independent Evaluation Panel (IEP)** is formed from the roster of experts selected through an open call. The IEP (at least 3 members' team per project) conducts a detailed evaluation of the full applications. This evaluation considers technical feasibility, financial viability, innovation, and the potential socio-economic and environmental impact of the projects. The IEP makes recommendations for projects to be approved by the Investment Committee (IC) for funding.

The **SECF Secretariat** is responsible for handling the applications and facilitating the approval process. Prior to submitting the IEP-recommended projects to the IC for final approval, the Secretariat - in coordination with the respective programme representative, concerned DP and AEPC - ensures the availability of funds, verifies the applicant's legal and financial compliance, and checks for any potential duplication of financial support. This step ensures that all recommended projects are ready for implementation and conform to the governance, regulatory, and financial standards set by the funding mechanism.

The **Investment Committee** is the highest decision-making authority of CREF and it approves the projects recommended by IEP for SECF support. The IC is headed by Joint Secretary of MoEWRI, with members including representative from Ministry of Finance, DPs, private sector, banks and AEPC Executive Director.

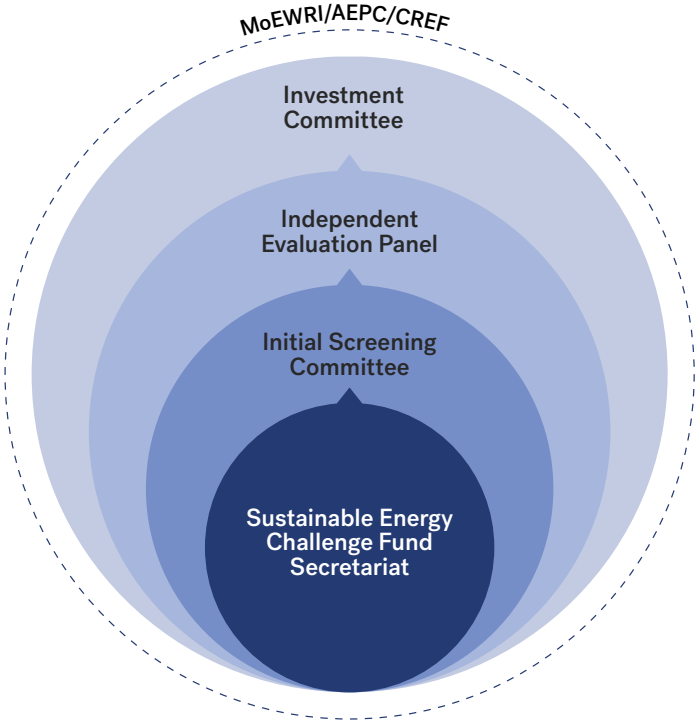



*Figure 2 : Governance Structures of SECF*

### 2.4 SECF Windows and Support Ceiling

In line with the amended CREF OM, eight funding windows have been established under the SECF. These windows were designed based on the analysis of demand, supply, and mandates, as well as the GoN's policy of developing a VGF support modality for DSE. The financial and technical support to be offered under each window are presented in Table 1.

**Sustainable Energy** refers to clean, reliable, efficient, and affordable energy solutions that meet current energy needs while safeguarding environmental integrity and ensuring long-term availability for future generations. In the context of SECF, sustainable energy encompasses renewable energy technologies—such as solar, micro-hydro, biogas, improved cookstoves including e-cooking, e-mobility, fuel switching and energy-efficient systems and practices that reduce energy consumption and greenhouse gas emissions.

As per the Clause 19.3 and Annex 5 of CREF OM, the SECF windows, eligible projects and support ceiling are presented as below.

**Table 1: SECF Windows and Support Ceilings**

| S.N. | SECF WINDOWS | ELIGIBLE PROJECTS | SUPPORT CEILING |
|---|---|---|---|
| 1. | Public Private Partnership (PPP) | DSE projects to be implemented with the investment of provincial/local government and private project developers with the PPP model | Capital grant up to 50% of the total project cost and TA |
| 2. | Demand Aggregation | Projects to be implemented by aggregating demand of sustainable energy solutions for increasing access to clean energy services to the households, Micro Small and Medium Enterprises (MSMEs) and public institutions | Grant to support market development & promotion and capacity development costs - maximum of 50% of these costs or < NPR 10 million or financial support requested - whichever is less |
| 3. | Reverse Auction | Projects aimed at improving household energy access through a reverse auction mechanism based on cost per household | Maximum NPR 10,000 per household or the financial support requested by the applicant – whichever is less |
| 4. | System Improvement | Projects that improve technical, financial or managerial improvement of existing mini and micro hydro and other renewable energy mini/micro grid projects | Capital support: 50% of the total improvement cost or < NPR 10 million or the financial support requested by the applicant - whichever is less |
| 5. | Interest Rate Buy down | Captive projects connected to the national grid, where a minimum of 51% of the annual energy produced is used for self-consumption | Maximum of 50% of the total interest on approved loan for maximum of 5 years or rate proposed by the applicant - whichever is less |
| 6. | Generation Based Incentives | Captive projects connected to the national grid, where a minimum of 51% of the annual energy produced is used for self-consumption | Based on the produced energy units of every 4 months - maximum of NPR 1.50 per unit for up to 5 years or generation based incentives proposed by the applicant - whichever is less |
| 7. | Innovative Projects | Any other innovative sustainable energy projects that meet the objectives of the SECF but do not fit within the financial support conditions mentioned above | Capital support - 50% of the total cost or < NPR 10 million or the financial support requested by the applicant-whichever is less |
| 8. | Loan Loss Guarantees | Loan Guarantee Mechanism with limited liability to ease collateral requirements | Maximum of 20% of the loan provided to SECF supported projects |

**Innovative Projects Under SECF**

SECF supports new ideas, business models and technologies that can transfer the clean energy landscape and encourage broader adoption. Examples of innovative projects include new business models such as pay-as-you-go solar, battery-as-a-service, electric vehicle charging stations, fuel switching projects, energy efficient technologies and other new technologies/business models. Many of these projects introduce smarter ways of delivering energy services by reducing costs, improving reliability, and creating new economic opportunities.

## 2.5 SECF Application and Approval Process

SECF application is a two-stage process. A two-stage application process comprising the concept note stage followed by the full application stage is adopted to ensure efficiency and quality in project selection. The concept note stage allows applicants to present concise project ideas for initial screening, enabling the ISC to assess eligibility, relevance, and alignment with program objectives without requiring full proposals from all applicants. Only the most promising and eligible concepts are then invited to submit detailed full applications, ensuring that both applicants' and evaluators' time and resources are used effectively.

In the first stage, concept notes of the proposed projects should be submitted through online portal www.secf.aepc.gov.np.Theconceptnoteswillbeevaluatedandshortlistedby the ISC.

In the second stage, full applications are requested from the shortlisted applicants. The full application has more detailed information about the project including objectives, project implementation, future sustainability, funding sources and capital budgeting including detailed financial analysis of the project.

The average time from concept note submission to Performance Based Agreement (PBA) signing is expected to be around 90 days. However, this varies depending on how quickly applicants provide the required project and company information. In the best-case scenario, some applications completed the approval cycle in as little as 40 days, while others took several months. Due Diligence Assessment (DDA) is the most time-consuming step, and its duration depends largely on the applicant's timely responses.

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*Quality Check of Penstock Pipes for Amadablam Mini Hydro Project*

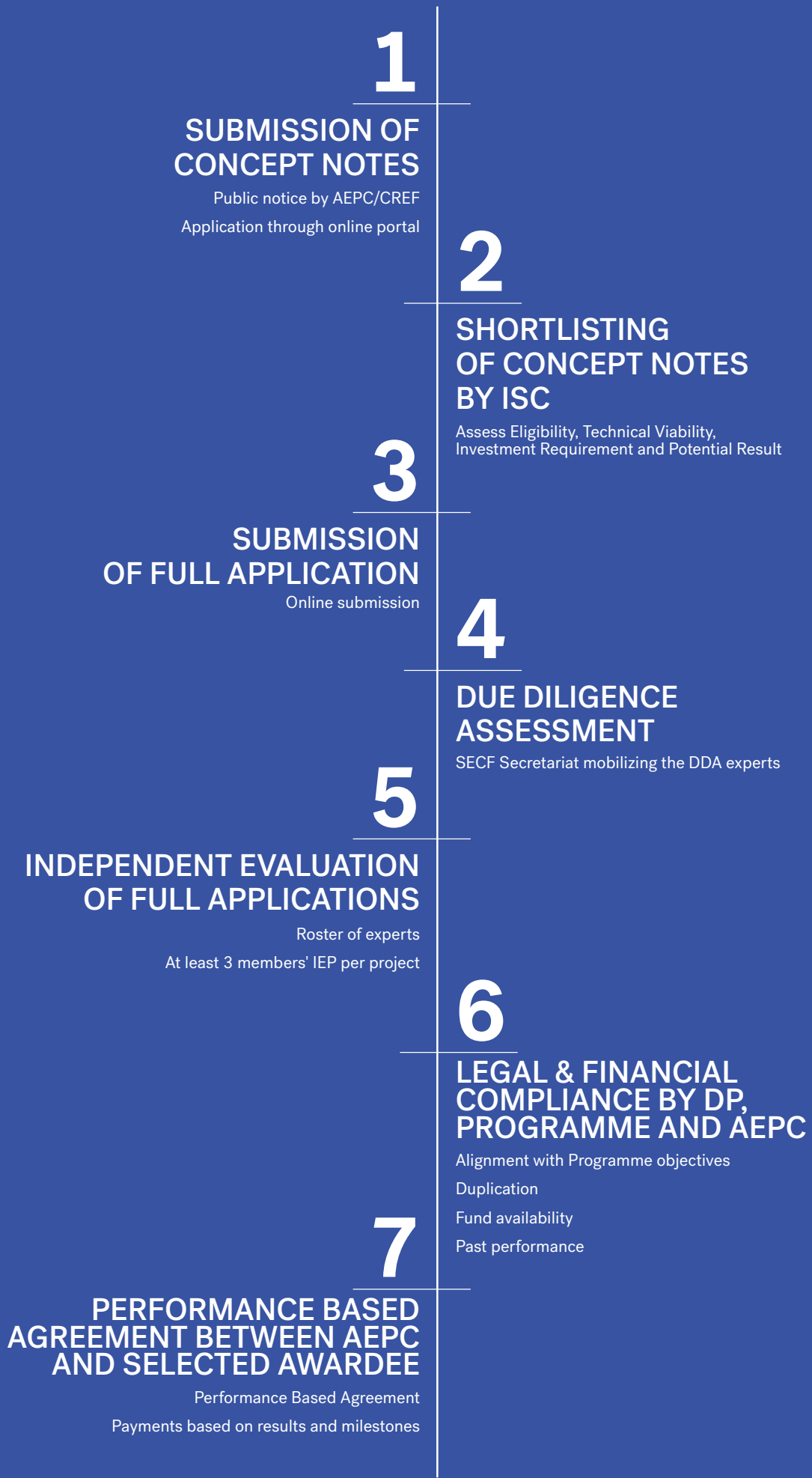


*Figure 3 : SECF Application and Approval Process*

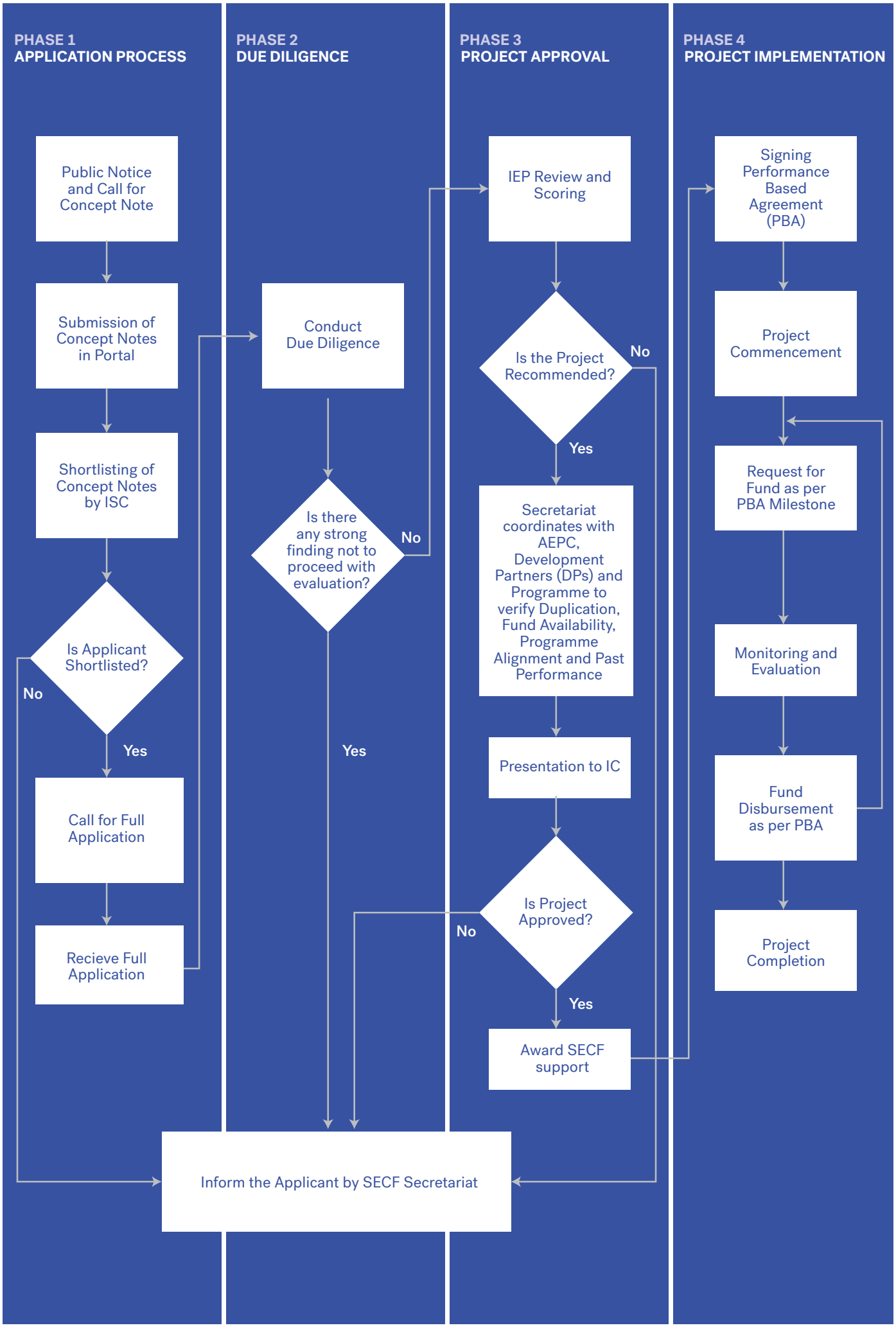


*Figure 4 : SECF Process Flow*

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*Induction Stoves' Repair and Maintenance Training*

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*Drying Vegetables in Solar Dryer at Palpa*

3

# Achievement of Sustainable Energy Challenge Fund

# 3 Achievement of Sustainable Energy Challenge Fund

## 3.1 Market Response

SECF has demonstrated a remarkable response from the market, reflecting growing interest and confidence in DSE projects and project developers. SECF received 731 concept notes from prospective applicants in the period of June 2021 to July 2025. Most of these concepts were designed to provide energy services to end users. In the Nepalese market, where renewable energy systems were promoted primarily through government subsidies mostly for energy access and companies functioned largely as vendors, this level of market response is impressive. With SECF support, marginally viable projects have become bankable, financial institutions have shown willingness to invest, and developers have benefited from enhanced TA provided by the project team. This high level of participation not only underscores the relevance and attractiveness of SECF's support mechanisms but also highlights the increasing engagement of private sector developers and entrepreneurs in advancing distributed sustainable energy and clean technology projects across the country.

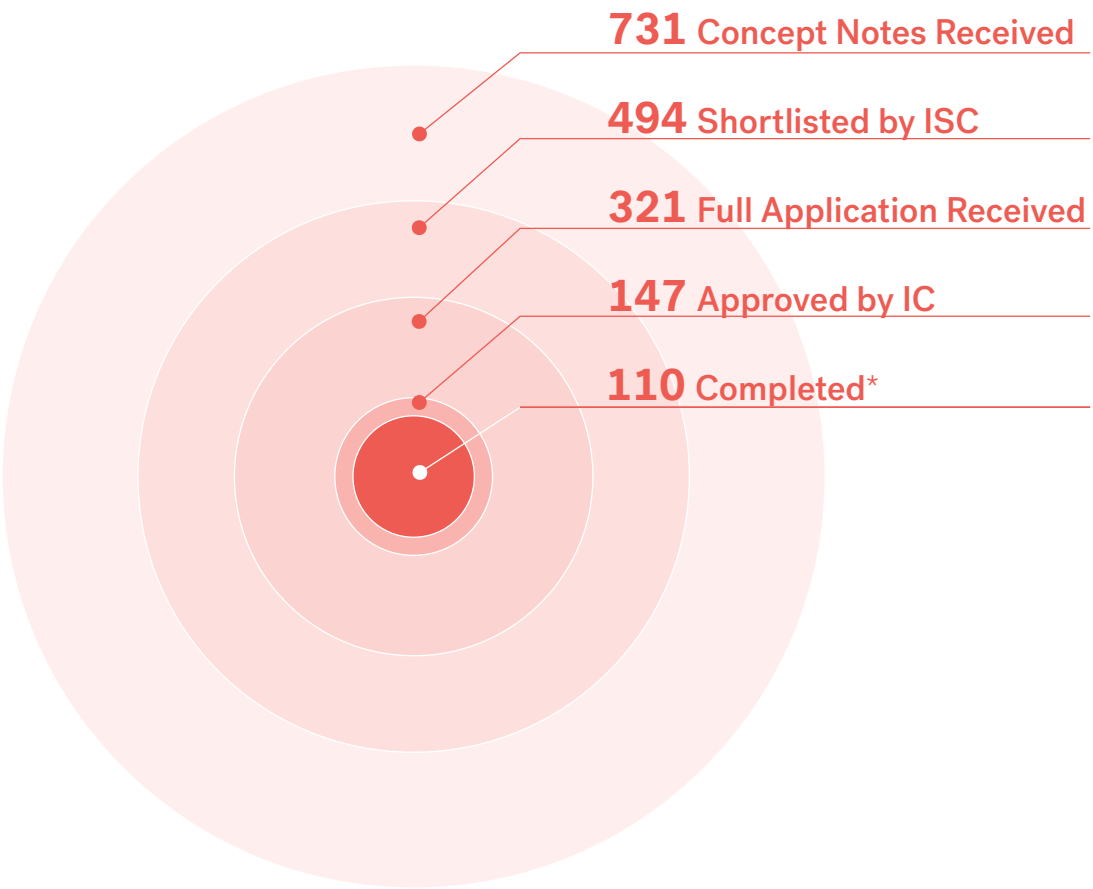



*Figure 5: Number of Projects Applied and Supported by SECF*

*as of December 2025

Out of the 731 concept notes received, 494 projects were shortlisted for the next stage of evaluation, and 321 applicants eventually submitted full applications. Notably, some shortlisted developers did not proceed to the full application stage, largely due to the ongoing economic slowdown. This presents an opportunity to re-engage these applicants, reassess their current interest, and explore potential project development in the evolving economic context. Some projects were not shortlisted because they were not financially viable even with SECF support, some of them were technically infeasible, or expected higher levels of financial assistance.

Out of 321 full applications, 147 projects, including one reverse auction project, were approved from the IC through a defined selection process. Some projects failed to reach financial closure because they could not show a viable business case or did not pass the DDA, so could not be successful in the evaluation process.

For the Reverse Auction Window, 23 Rural Municipalities submitted Expressions of Interest for last mile electrification. However, in most of these areas, either the Nepal Electricity Authority (NEA) was expanding the national grid or local micro-hydro projects were under construction, so installation of standalone solar home systems did not meet the selection criteria. Hence only one feasible project was approved by the IC.

Similarly, 14 banks submitted Expressions of Interest to participate in the Loan Loss Guarantee (LLG) mechanism, out of which 8 banks signed agreements with AEPC.

## 3.2 Projects Supported

A total of 147 projects were approved to receive support from the SECF. Following approval, 11 projects were withdrawn by the applicants citing the reasons of economic difficulties from their side and shifts in investment priorities. One of the withdrawn projects was discontinued because of government plans to expand the national grid in the proposed areas. Consequently, 136 projects have proceeded to the implementation stage. Among these, 110 projects have been successfully completed, contributing tangible benefits to the country's renewable energy landscape, while 26 projects are currently under construction and progressing toward completion. This reflects SECF's continued commitment to fostering high-quality, near-commercial DSE projects despite challenging economic conditions.

Financial resources from BEK and GIZ/REEEP-GREEN are mobilised as SECF support to these projects, where AEPC, Local and Provincial Government and private sector have made significant investments. The Table 2 presents the number of projects by technology supported by two development partners.

## Table 2: Number of Projects Supported by Different Development Partners

| SN | SECF WINDOWS | NO. OF PROJECTS |
|---|---|---|
| **Projects Supported by BEK Fund** | | |
| 1 | Electric Cook Stoves | 6 |
| 2 | Bio Energy | 7 |
| 3 | Electric Vehicle (EV) Charging Stations | 39 |
| 4 | Captive Solar PV Projects | 55 |
| 5 | Micro Hydro System Improvement | 2 |
| 6 | Solar Dryer | 1 |
| 7 | Solar Water Pump | 1 |
| 8 | Solar Home Systems | 1 |
| 9 | Bio CNG | 1 |
| 10 | Mini Hydro Project | 1 |
| **Sub-total** | | **114** |
| **Projects supported by GIZ/REEEP-GREEN Fund** | | |
| 1 | Various Small-Scale Technologies (Electric Cooking, Home Biogas, Electric 3-Wheelers, Solar Pumps) | 5 |
| 2 | Micro Hydro System Improvement | 2 |
| 3 | Hy-pump | 1 |
| 4 | EV Charging Stations | 14 |
| **Sub-total** | | **22** |
| **TOTAL** | | **136** |

### 3.3 Projects by SECF Windows

Number of SECF projects under all eight SECF windows are depicted in the figure 6.

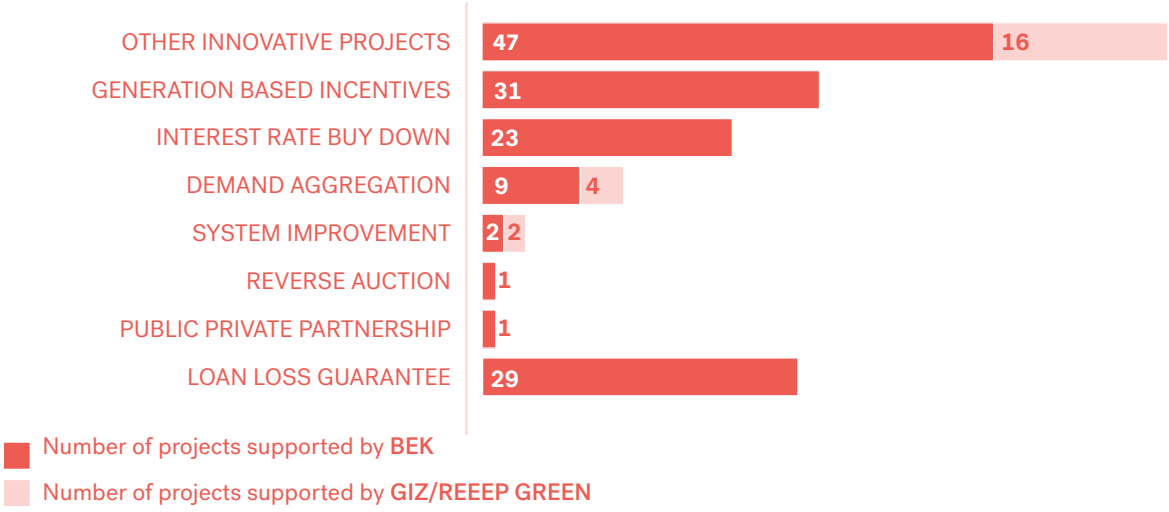



*Figure 6: Number of Projects Supported by SECF Windows*

The most popular windows were Innovative Projects, Generation-Based Incentives, and Interest Rate Buy-Down. Out of the 136 projects supported, 114 were from BEK fund and 22 were from GIZ/REEEP-GREEN fund. In addition to this, LLG was provided to 29 project loans financed by 5 partner banks, and these projects also received SECF support from other windows. The LLG is to the banks rather than to the project developers.

## 3.4 Major Achievements

Key Impact of SECF are Catalysed Investment, Transformed Energy Delivery, Fostered Innovations and Strengthened Partnerships.

*Catalysed Investment* – DSE projects of worth NPR 3,837,810,545 (~USD 26.8 million) were developed with the support from SECF[2]. The SECF has been highly successful in mobilising additional resources through its strategic use of blended finance. For every Nepali Rupee disbursed from SECF, approximately 3.3 Nepali Rupees have been leveraged from private (3.1 Nepali Rupees) and public investments (0.24 Nepali Rupees). This leverage ratio of 1:3.3 from SECF to the private and public sectors highlights the fund's effectiveness in crowding in capital from multiple sources, amplifying the overall impact of limited public funds. The experience of SECF demonstrates that the blended financing approach, combining concessional public support with private sector investment, is not only viable but also highly effective in accelerating the growth and sustainability of the DSE sector in Nepal. It has strengthened investors' confidence, enabled banks to provide loans of up to 100% of project costs, encouraged innovation in business models, and supported the expansion of clean energy solutions across the country.

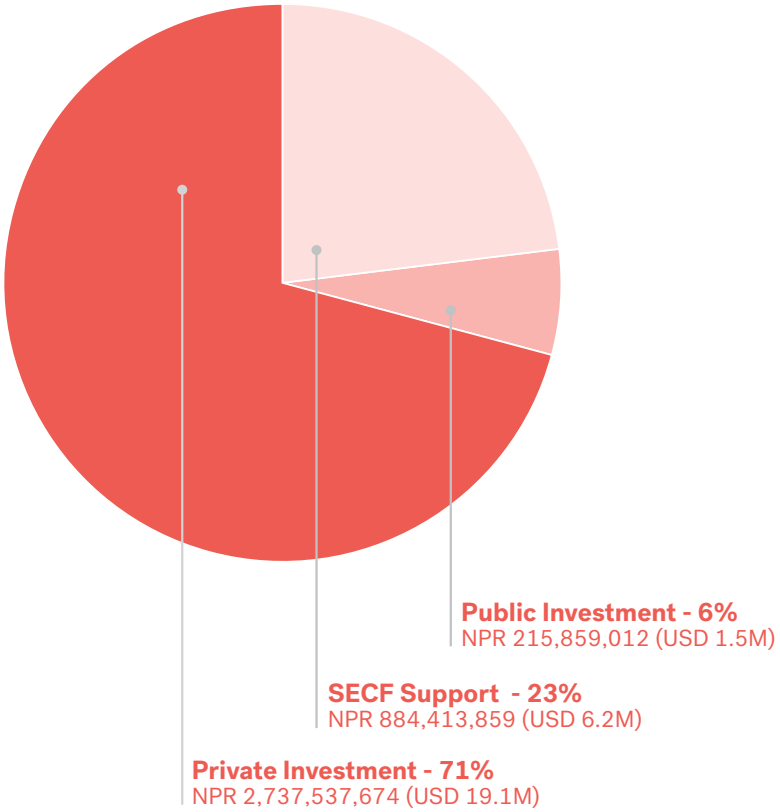



*Figure 7: Investment Leveraged in SECF Supported Projects*

*Transformed Energy Delivery* – SECF has enabled a shift away from fossil-based and inefficient energy use towards cleaner, more reliable, and cost-effective energy services across households, industries, and transport.

- 26.1 MWp of solar rooftop systems installed, including 11.6 MWp delivered under the Renewable Energy Service Company (RESCO) model, demonstrating scalable private sector led clean energy service delivery.
- 47,247 households transitioned to electric cooking, reducing reliance on Liquified Petrolium Gas (LPG) and traditional biomass while improving indoor air quality and household energy affordability.
- 132+ Electric Vehicle (EV) charging stations deployed, strengthening e-mobility infrastructure and supporting market confidence in EV uptake.

2 The project payment disbursements were made at different times, when the exchange rates was different than the rate mentioned in this document. Therefore, the amounts in Nepali currency are accurate, while the corresponding total amount in USD presented here is lower than the actual disbursement.

**Renewable Energy Service Company (RESCO) Model**

RESCO model, also called Energy Service Company (ESCO) model, refers to a business model where a company installs and operates a clean energy system in a consumer's premises, and the consumer pays only for the energy generated by the system. This model allows consumers to utilise clean energy without the upfront costs and maintenance responsibilities associated with owning the system.

**Capital Expenditure (CAPEX) Model**

In the CAPEX model, the end-user or client invests upfront to purchase and own the renewable energy system. The owner bears the cost of installation, operation, and maintenance, and directly benefits from the energy savings or generation over the system's lifetime. This model is suitable for consumers with sufficient capital who prefer full ownership and long-term cost savings from renewable energy assets.

- Industrial fuel-switching supported(fossil to briquettes/pellets) through RESCO arrangements, lowering operating costs and emissions while maintaining reliable heat/steam supply.

The business model of providing energy services to the industries through RESCO is widely adopted and accepted by both private sectors and service receivers as the service is efficient and prompt.

SECF has also supported microfinance institutions (MFIs) and local financial institutions (LFIs) to deploy 47,274 electric cookstoves, 189 electric water pumps, 18 home biogas and 360 e-rickshaws mostly through affordable credit financing. The MFIs designed dedicated loan products for electric cooking and water pumps such that the loan repayment installments could be paid by the loanee with the savings from shifting from the more expensive conventional fuels to cheaper clean energy sources. Total of 132 electric vehicle charging stations have been installed with SECF support. SECF has also supported 4 micro hydro projects to upgrade and connect to the national grid. Furthermore, SECF also partnered with provincial and local governments to provide electricity through solar home systems to 369 households in a remote community of Nepal.

*Fostered Innovation* – SECF has enabled an environment for the private sector to introduce innovative technologies and business models. 63 innovative projects were supported through Innovative Projects Window. SECF has also introduced a ground breaking PPP model for developing mini hydro projects. This model can be replicated by other local governments to generate a steady source of revenue for local development. Despite the high demand for PPP projects in grid-connected solar and mini-hydro, only one project ultimately materialised. Grid-connected solar projects could not advance because developers were unable to secure Power Purchase Agreements with NEA. Similarly, mini-hydro projects did not progress as the risk and revenue sharing models remained unresolved, and there were constraints related to funding availability and time toward the end of NREP.

SECF demonstrated the examples of supporting different innovation business models and technologies for the first time in Nepal.


*Figure 8: Key Innovative Interventions*

*Strengthened Partnerships* – AEPC collaborated with the World Bank and GIZ/EU to secure additional funding for SECF project financing. It has also partnered with 136 energy companies, project developers, LGs, PGs and communities to develop DSE projects. 66 financial institutions have financed DSE projects.

These initiatives have also generated new direct and indirect jobs in areas such as project operation, and maintenance, thereby promoting green employment and local economic growth. In addition, several jobs were created during the installation of these systems.

## 3.5 Contribution of SECF on National Energy and Climate Agenda

**CONTRIBUTION TO NATIONALLY DETERMINED CONTRIBUTION (NDC)**

SECF has made a significant contribution towards achieving Nepal's Second NDC and NDC 3.0 targets. The installation of 26.1 MWp rooftop solar PV Projects under SECF has contributed to the NDC target of promoting energy generation mix. Likewise, the installation of over 47,000 electric cookstoves has directly contributed to the NDC target of expanding the use of electric cookstoves to 2.1 million households and an additional 15,000 institutions and firms. Furthermore, NDC 3.0 envisions the development of adequate charging infrastructure to meet the quantified targets for electric vehicles by 2030 and 2035. In this regard, SECF's support for the establishment of 132 electric vehicle charging stations (with combined capacity of 22.1 MW) across Nepal has been instrumental in advancing this national target.

**CONTRIBUTION TO ENERGY DEVELOPMENT ROADMAP 2024**

The results achieved through the SECF are also well aligned with the Energy Development Roadmap, 2024 (2081 BS) put forward by the GoN. The installation of rooftop solar PV Projects under SECF has supported the national goal of expanding renewable electricity generation to 14,031 MW by 2030 and 28,500 MW by 2035. The roadmap emphasises diversification of the national energy mix, promotion of renewable energy technologies, and reduction of dependence on imported fossil fuels.

In line with these priorities, SECF-supported rooftop solar projects have contributed to expanding the share of distributed renewable energy generation, thereby strengthening energy security and resilience. Similarly, SECF's support for fuel-switching initiatives in MSMEs has facilitated a cleaner and more efficient energy transition, reducing reliance on conventional fossil fuels. Furthermore, the development of EV charging infrastructure across the country under SECF directly supports the roadmap's objective of reducing petroleum imports by accelerating the shift toward electric mobility. Together, these interventions demonstrate SECF's strategic role in operationalising Nepal's Energy Development Roadmap through practical, scalable, and market-driven solutions.

**CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS**

SECF has also contributed directly to the achievement of the Sustainable Development Goals (SDGs) by promoting access to clean, affordable, and reliable energy solutions. Through its support to innovative business models and renewable energy projects, SECF advances SDG 7 (Affordable and Clean Energy) while also generating co-benefits across SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 13 (Climate Action). By leveraging private investment and encouraging sustainable energy markets, SECF plays a catalytic role in driving inclusive, low-carbon development in Nepal.

IN PHOTO

*EV Charging Station at Hetauda*

## 3.6 Projects Supported Under Various Windows

### 3.6.1 PUBLIC PRIVATE PARTNERSHIP

This SECF window is meant to support Provincial and Local Governments to develop RE projects under the PPP model. Special Purpose Vehicle (SPV) needs to be formed to develop such projects through PPP. All approved projects under this window can also obtain necessary TA from SECF. TA includes support for institutionalising PPP arrangements with appropriate risk and return sharing mechanisms; monitoring the implementation process; ensuring the quality of project components; and facilitating the fund disbursement process from banks, local governments, and AEPC.

During this period, one PPP project was supported through SECF. The Amadablam Mini Hydro Project (911 kW), located at an altitude of over 4,400 meters in the Everest region, stands as the highest-altitude mini hydropower plant in the world. Developed by Amadablam Mini Hydro Pvt. Ltd., this run-of-river project utilises the waters of Cholunche Khola (Nare Khola) to deliver clean and reliable electricity to 451 households across 19 villages, including Chukhung, Dingboche, Pangboche, Tengboche, and others. This project is under construction.

The total project cost amounts to NPR 618,901,639 (~USD 4.3 M), of which NPR 240,544,639 (~USD 1.7M) is private investment and NPR 80,000,000 (~USD 0.6M) is public investment from Pasanglhamu Rural Municipality. The project received VGF support of NPR 170,050,000 (~USD 1.2M) from SECF. The Nepal: Private Sector-Led Mini-Grid Energy Access Project (MGEAP) supported by GoN and the World Bank provided this additional support of NPR 128,307,000 (~USD 0.9M) and concessional loan through a partner bank. In total, AEPC's two funding mechanisms contributed NPR 298,357,000 (~USD 2.1M), accounting for less than 50% of the total project cost and remaining within the ceiling of the PPP Window.

> **Public-Private Partnership** model is a collaborative arrangement between the government (public sector) and private companies (private sector) to finance, design, implement, and operate projects or services that are traditionally provided by the public sector. In a PPP, both parties share risks, responsibilities, and rewards according to their capabilities and interests. The arrangement is guided by a formal PPP agreement, which clearly defines the roles, obligations, returns and risk-sharing mechanisms between the partners.

This project also offers the opportunity for the local government to earn sustainable sources of revenue from their investment. Once the project becomes operational, the LG will receive around NPR 4,000,000 (~USD 27,900) annually as return for their investment.

IN PHOTO

*Amadablam Mini Hydro Project under Construction*

### 3.6.2 DEMAND AGGREGATION

Subsidies have played an important role in expanding energy access in rural and remote areas. For wider adoption of renewable energy technologies and graduation to tier 3 and above, innovative approaches such as demand aggregation are more market-oriented and sustainable. Rural households and enterprises, most of them MSMEs with potential to adopt RE technologies, often lack the necessary information or access to finance to develop and utilise appropriate solutions. Reaching these households and enterprises requires additional investment and entails higher risks for demand creation and aggregation. The private sector alone is unlikely to bear these costs and risks. SECF addresses this gap by absorbing such additional market development costs and associated risks, enabling renewable energy solutions to evolve into viable business propositions over time.

IN PHOTO

*E-rickshaw Promoted through SECF*

Under this window, SECF supported 13 projects, mostly targeting small-scale technologies like electric cook stoves, solar water pumps and pellet-based burners. In these projects, households and enterprises installed these systems on their own cost either from equity or with the loan from the MFIs and LFIs. This clearly demonstrates that promotion of such technologies requires development of business ecosystem. Households seek technology suppliers located nearby, with reliable after-sales services and access to affordable credit for purchasing the systems. A strong and coordinated relationship between MFIs/LFIs and suppliers is essential to ensure timely delivery and quality of products and services.

The promotion of electric cookstoves via MFIs and LFIs within the "Demand Aggregation" window of SECF has targeted women, disadvantaged and marginalised groups of the community. The electric cookstoves have been purchased by them on credit at discount rate. Additionally, some of them have been trained in repair and maintenance, which has empowered them and eased their daily life. As MFIs/LFIs have large outreach and work with women and disadvantaged groups, efforts were made to reach these technologies among them through massive awareness building and strengthening the supply chain.

#### INVESTMENT MOBILISATION

These demand aggregation projects have mobilised a total investment of NPR 752,704,546 (~USD 5.3M), of which NPR 66,718,899 (~USD 0.47M) was provided as SECF support and NPR 685,985,647 (~USD 4.8) was contributed by the private sector including the household investments and loan from the financial institutions. The resulting leverage ratio of 1:10.3 is highly impressive. Such investment mobilisation is not possible without support for the aggregation of demands. This clearly demonstrates that developing a business ecosystem is essential for wide adoption of small-scale technologies, as their economic and social benefits far outweigh the investment costs. Instead, the focus should be on developing a robust market ecosystem that ensures the availability of quality products, reliable installation, and effective after-sales services. Strengthening these market enablers will enhance user confidence, drive further private sector participation, and promote the sustainable growth of small-scale renewable energy technologies.

**Table 3: List of Projects Supported under Demand Aggregation Window**

| S.N. | NAME OF THE PROJECT DEVELOPER | INDUCTION STOVE | SOLAR PUMP | ELECTRIC PUMP | PALLET STOVES/ BURNER | HOME BIOGAS | E-RICK-SHAWS | PROVINCE |
|---|---|---|---|---|---|---|---|---|
| 1 | Janautthan Samudayic Laghubitta Bittiya Sanstha Limited | 3245 | - | | | - | - | Madesh, Lumbini, Karnali |
| 2 | Sana Kisan Bikas Laghubitta Bittiya Sanstha Limited | 8813 | - | | | - | - | Lumbini |
| 3 | Nirdhan Utthan Laghubitta Sanstha Limited | 1000 | - | | | - | - | Lumbini, Karnali |
| 4 | Environment Development Multi-purpose Cooperative Limited | 2053 | - | | | - | - | Karnali |
| 5 | Mithila Laghubitta Bittiya Sanstha Limited | 10,000 | - | | | - | - | Madesh |
| 6 | Mero Microfinance Laghubitta Bittiya Sanstha Ltd | | 29 | 60 | | | | Madesh |
| 7 | JBS Urja Pvt. Ltd | 10,000 | | | | | | Madesh |
| 8 | Husk Power Nepal Pvt. Ltd | | | | 290 | | | Madesh |
| 9 | Janda Devi Nepal Energy Pvt. Ltd | | | | 44 | | | Madesh |
| 10 | Sahara Nepal Saving and Credit Cooperative Society Limited | 12,008 | | | | | | Koshi |
| 11 | Srijanshil Savings & Credit Cooperative Ltd | | | | | 10 | 120 | Sudur-paschim |
| 12 | Upakar Laghubitta Bittiya Sanstha Limited | 155 | | | | 1 | | Lumbini |
| 13 | Kisan Bahuudeshiya Sahakari Sanstha Ltd. | | | | | 7 | 240 | Sudur-paschim, Lumbini |
| **TOTAL** | | **47,274** | **29** | **60** | **334** | **18** | **360** | |

# Overcoming Drought: Solar Irrigation Pump Empowers Returnee Migrant in Sarlahi

Ram Pratap Sahani + Binita Kumari Sahani

For returnee migrant Mr. Ram Pratap Sahani and his wife Mrs. Binita Kumari Sahani of Ishworpur, Sarlahi, a solar irrigation pump has brought a remarkable turnaround in their family enterprise. After years of working abroad, Mr. Sahani returned home determined to build a sustainable livelihood. Managing a 2.5-acre fishpond, the family faced severe challenges due to unreliable rainfall and water shortages.

Unfortunately, a prolonged drought caused devastating losses, nearly NPR 500,000 worth of fish. "Before the solar pumps, we were completely dependent of the monsoon, which is generally irregular. Now, we have access to water throughout the day," Mr. Sahani reflects.

With a reliable water supply, their fish production has soared, meeting strong market demand. Today, the Sahanis earn nearly NPR 2 million (USD 13,950) annually from their fishpond. "Our yield has improved, and our farm has flourished," adds Mrs. Sahani.

This transformation was made possible through a solar water pump purchased via credit financing from Mero Microfinance, under the SECF's Demand Aggregation Window. By promoting and developing the market for solar irrigation pumps, SECF has enabled families like the Sahanis to achieve clean, efficient, and resilient farming, turning challenges into opportunities for growth.

Samita Kathent

# Cooking Smart, Living Cool: Women's Adaptation to Heat Waves in Terai

In Nepal's Terai, cooking during heat waves is exhausting-especially for women using firewood or LPG. Kitchens become unbearably hot, and with fire wood and LPG, fans can't be used because the flame goes out. Samita Kathent from Jhapa faced this daily struggle, making tea for farm workers 10-15 times a day. Refilling LPG cost her NPR 2,000 (USD 14), adding financial stress.

Switching to an induction stove changed everything. It cooks faster, keeps the kitchen cooler, and costs only NPR 300-400 (USD 2-3) extra in electricity monthly. Previously, LPG refills were a financial burden.

Her story reflects a larger shift: with SECF support, over 47,000 households have adopted e-cooking, reducing costs and improving cooking environments for thousands of women. This simple change empowers women, saves time, and builds resilience against rising heat in climate-vulnerable Terai.

Bimala BK

# E-rikshaw is More Appealing than Regular Job for Bimala

In Nepal, while women driving private vehicles is becoming quite common in major cities of Nepal, professional driving is still very much dominated by men. Females are under-represented due to societal perceptions and biases about driving as a male-dominated profession. To address the existing gaps, in the early 2025, Srijanshil Cooperative with the support of REEEP-GREEN organised two electric rickshaw driving training sessions exclusively for women.

A total of 54 women participated in these trainings. After completing the training, the women were offered loans to purchase electric rickshaws. To date, in the year 2025, more than 64 women have acquired their own rickshaws from Srijanshil in and begun professional driving careers.

Bimala BK is one of the many women drivers who has taken a loan from Shreejanshil Cooperative in Dhangadi. After completing high school, Bimala was searching for a job. Her aunt, who also drove an e-rickshaw, suggested driving rickshaws to her as it offered both independence and better financial returns. Comparing the potential earnings of NPR 10-12,000 (USD 72-86)per month in a regular 9 am to 5 pm job to driving her own e-rickshaw, Bimala found the latter more appealing.

Her monthly income from driving a rickshaw is approx. NPR 48,000 (USD344), which is more than enough to pay monthly instalment of NPR 20,000 (USD143) to the cooperative, manage household expenses, and support the educational expenses of her family. She says, "I spend only NPR 2,500 (USD18) each month on charging my e-rickshaw. If I drove a diesel-powered rickshaw, my monthly fuel expenses would be much higher."

### 3.6.3 REVERSE AUCTION

Through this SECF window, AEPC collaborated with Khatyad Rural Municipality and the Karnali Provincial Government, to support 369 households in Khatyad Rural Municipality to install 80 Wp solar home systems. These households were among the most energy-deprived communities in the region, lacking access to any form of modern lighting prior to the intervention. The initiative has not only provided clean and reliable electricity for lighting and basic household needs but also significantly improved the living conditions of the residents. Children now have better opportunities for evening study, households have engaged in small-scale income-generating activities after dark, and reliance on traditional sources has been eliminated. This initiative stands as a strong example of how coordinated efforts between federal, provincial, and local governments can contribute toward Nepal's universal energy access goals.

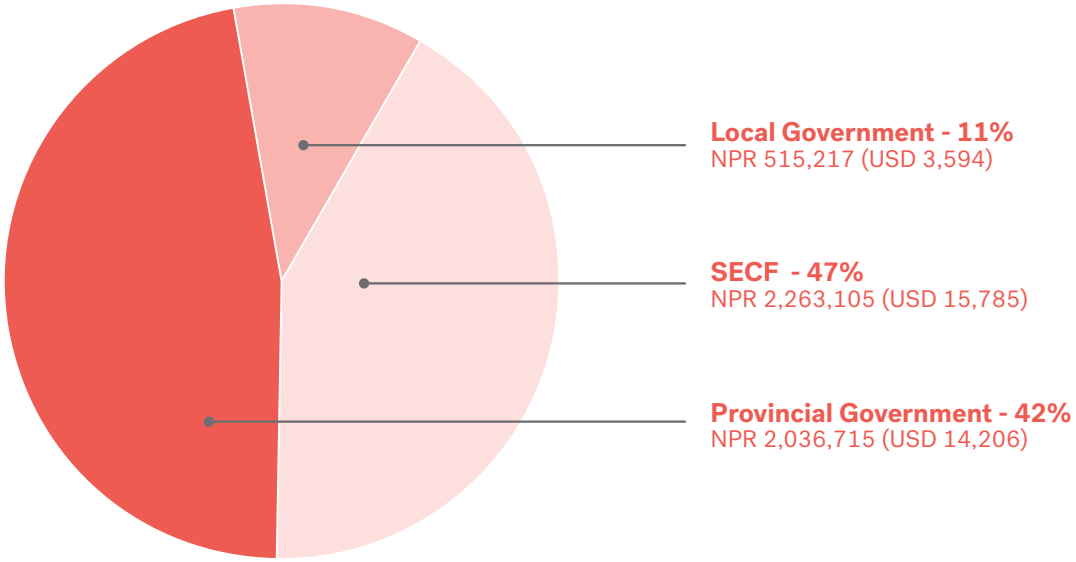



*Figure 9: Resource Contribution for Solar Home System Project in Mugu*

IN PHOTO

*Distribution of Solar Home Systems through Reverse Auction in Mugu*

### 3.6.4 SYSTEM IMPROVEMENT PROJECTS

With the support of the SECF, four micro-hydro projects have been successfully connected to the National Grid, marking an important milestone in integrating small-scale renewable energy systems into the national electricity network. Together, these projects have a total installed capacity of 343 kW, contributing to local energy access, making these projects financially sustainable, thereby contributing to the local economy while contributing to the energy generation mix.

Through SECF's System Improvement Window, these projects received technical and financial support to upgrade their systems and meet grid connection standards. Upgradation of the system includes repair and maintenance of the micro hydro project (MHP) project components, improvement of canal, replace of electric poles and making the system compatible for grid connection. The SECF's contribution of NPR 19,376,677 (~USD135,152) helped leverage an additional NPR 16,831,712 (~USD 117,401) from private investors and NPR 5,000,000 (~USD34,875) of public funding, demonstrating SECF's catalytic role in mobilising co-financing for distributed sustainable energy projects.

This initiative not only strengthens the financial viability of micro-hydro plants but also opens new opportunities for local energy enterprises to supply clean electricity to the grid, ensuring sustainable income generation and long-term operational sustainability.

**Table 4: List of Projects Supported under System Improvement Window**

| S.N. | NAME OF THE PROJECT DEVELOPER | CAPACITY OF THE PROJECT (kW) | LOCATION OF THE PROJECT | PROVINCE |
|---|---|---|---|---|
| 1 | Jhumsa Khola MH Power Generation Cooperative Ltd. | 68 | Mathagadhi, Palpa | Lumibini |
| 2 | Chanchalaghat Laghu Jalvidhyut Sahakari Sanstha | 100 | Badigad, Baglung | Gandaki |
| 3 | Nishi Khola II Laghu Jalvidyut Sahakarai Sanstha Ltd. | 100 | Nishi, Baglung | Gandaki |
| 4 | Girindi Khola Laghu Jalbidhyut Sahakari Sanstha Limited | 75 | Girindi, Badigad, Baglung | Gandaki |

Out of these four projects, two projects Chanchalghat and Nishi Khola II were supported by REEEP-GREEN whereas Jhumsakhola and Girindi Khola projects were supported by the BEK fund.

# Jhumsa Khola Microhydro Project: Turning Idle Assets into Economic Opportunity

Inspection before the final run!

Across Nepal, hundreds of microhydro projects were built over decades with major investments from the government, development partners, and communities. These projects electrified remote areas, improving livelihoods and reducing energy poverty. However, as the national grid expanded, many plants were abandoned or underused, causing financial losses and wasted infrastructure. Despite this, microhydro systems remain valuable renewable assets. With grid integration, they can generate clean power, create revenue, and support Nepal's sustainable energy goals.

The Jhumsa Khola Microhydro Project shows how revival is possible through net metering. Instead of shutting down, it now feeds surplus electricity into the national grid, ensuring no energy is wasted and turning local generation into an economic opportunity.

Sustainability Highlights

- Economic Empowerment: By selling surplus electricity, the community is expected to generate up to NPR 200,000 (USD1395) per month.

- Reliable Energy Access: No more power shortages due to seasonal water fluctuations.

- Sustainable Livelihoods: With affordable and uninterrupted electricity, local businesses are thriving.

Community-led projects like Jhumsa Khola III show that microhydro is not obsolete - it's a cornerstone of Nepal's renewable energy strategy. By integrating these systems into the national grid, Nepal reduces reliance on costly fuel imports, transmission losses are minimised through localised generation, the grid becomes more resilient against blackouts and demand spikes.

Jhumsa Khola III is more than a power plant-it's a model for sustainability and economic revival. It proves that with smart integration, microhydro can deliver clean energy, financial security, and climate resilience. Instead of being abandoned, these projects can power Nepal's journey toward a greener, self-sufficient future. Inspired by this success, several other microhydro plants have also connected to the grid, transforming local generation into economic opportunity.

### 3.6.5 INTEREST RATE BUY DOWN

A total of 23 rooftop solar projects with a combined installed capacity of 11,328.54 kWp were approved under the Interest Rate Buy-Down window of SECF. These projects mobilised NPR 559,231,782 (~USD 3,900,619) in private investment, supported by NPR 81,661,020 (~USD 569,582) from SECF in the form of interest rate buy-down assistance. The resulting leverage ratio of SECF support and private investment is 1:6.85.

| | |
|---|---|
| Number of Projects | 23 |
| Total Installed Capacity | 11,328.54 kWp |
| Average Project Size | 492.55 kWp |
| Average Project Cost | NPR 49,365 (~USD344) per kWp |
| Average SECF Support | NPR 7,208 (~USD50) per kWp |
| Number of Projects with RESCO Model | 5 |
| Number of Projects with Asset Owned Model | 18 |

**Table 5: List of Projects Supported under Interest Rate Buy Down Window**

| S.N. | NAME OF THE PROJECT DEVELOPER | CAPACITY (kWp) | LOCATION OF THE PROJECT | BUSINESS MODEL | OFF TAKER |
|---|---|---|---|---|---|
| 1 | Siddhi Vinayak Auto International Pvt. Ltd. | 26.65 | Bhairahawa, Lumbini | Asset Owned | |
| 2 | Bhaskar Herbaceuticals Pvt. Ltd | 100.8 | Birgunj, Madhesh | Asset Owned | |
| 3 | Gharana Foods Pvt. Ltd | 100.28 | Bhairahawa, Lumbini | Asset Owned | |
| 4 | Butwal Flour Mill Pvt. Ltd. | 154.7 | Bhairahawa, Lumbini | Asset Owned | |
| 5 | Mount Everest Kattha Mills Pvt. Ltd. | 356.4 | Bhairahawa, Lumbini | Asset Owned | |
| 6 | Premia Foods Additive Pvt. Ltd. | 201.65 | Birgunj, Madhesh | Asset Owned | |
| 7 | Sunmai Water Pvt. Ltd. | 50.73 | Jhapa, Koshi | Asset Owned | |
| 8 | Nuplast Industries Pvt. Ltd. | 356.4 | Bara, Madhesh | Asset Owned | |
| 9 | Jayshree Polymers Private Limited | 478.38 | Sunsari, Koshi | Asset Owned | |
| 10 | Jayshree Pu Tech | 478.38 | Sunsari, Koshi | Asset Owned | |
| 11 | Comtronics Pt. Ltd. | 52.32 | Lalitpur, Bagmati | RESCO | Aarus Lifestyle Hospital |
| 12 | Comtronics Pt. Ltd | 512 | Bhairahawa, Lumbini | RESCO | Devdaha Medical College |
| 13 | System and Energies Pvt. Ltd. | 500.42 | Pokhara, Gandaki | RESCO | Manipal Teaching Hospital Pvt. Ltd. |
| 14 | Gham Urja Sewa Pvt. Ltd | 1267 | Biratnagar, Koshi | RESCO | Arihant |

| S.N. | NAME OF THE PROJECT DEVELOPER | CAPACITY (kWp) | LOCATION OF THE PROJECT | BUSINESS MODEL | OFF TAKER |
|---|---|---|---|---|---|
| 15 | Nepal Ekarat Engineering Company Pvt. Ltd. | 224.4 | Hetauda, Bagmati | Asset Owned | |
| 16 | Om Megashree Pharmaceuticals Limited | 347.6 | Chitwan, Bagmati | Asset Owned | |
| 17 | Nutri Foods Pvt. Ltd.* | 1217.7 | Biratnagar, Koshi | Asset Owned | |
| 18 | Durga Steel Industries Private Limited* | 670 | Jhapa, Koshi | Asset Owned | |
| 19 | Gham Urja Sewa Limited* | 350.55 | Sukrauli, Parasi, Lumbini | RESCO | Balaji Granito |
| 20 | Arihant Multi-Fibre Limited* | 1,187 | Sonapur, Sunsari | Asset Owned | |
| 21 | Arihant Poly-Packs Limited* | 1,101.1 | Sonapur, Sunsari | Asset Owned | |
| 22 | Dynamic Foods Pvt. Ltd.* | 332.1 | Sukrauli, Parasi, Lumbini | Asset Owned | |
| 23 | Lumbini Ceramics Limited* | 1,261.98 | Gulariya, Bardia, Lumbini | Asset Owned | |
| **Total Installed Capacity** | | **11,328.54** | | | |

*Projects under construction.

### 3.6.6 GENERATION BASED INCENTIVES

A total of 31 rooftop solar projects with a cumulative installed capacity of 14,492 kWp were supported under the Generation-Based Incentive (GBI) window of SECF. These projects received NPR 133,860,802 (~USD933,674) as SECF support, which successfully leveraged NPR 774,517,906 (~USD5,402,231) in private investment. The resulting leverage ratio of SECF support and private investment is 1:5.79. This means that for every Nepali Rupee of SECF support, Nepali Rupees 5.79 of private investment was mobilised, demonstrating the effectiveness of the SECF mechanism in stimulating private sector participation and accelerating the deployment of rooftop solar systems across the country.

| | |
|---|---|
| Number of Projects | 31 |
| Total Installed Capacity | 14,492 kWp |
| Average Project Size | 467 kWp |
| Average Project Cost | NPR 53,445 (~USD373) per kWp |
| Average SECF Support | NPR 9,237 (~USD64) per kWp |
| Number of Projects with RESCO Model | 19 |
| Number of Projects with Asset Owned Model | 12 |

## Table 6: List of Projects Supported under Generation Based Incentives Window

| S.N. | NAME OF THE PROJECT DEVELOPER | CAPACITY (kWp) | LOCATION OF THE PROJECT | BUSINESS MODEL | OFF TAKER |
|---|---|---|---|---|---|
| 1 | Maruti Print & Pack Ltd. | 610.4 | Birgunj, Madhesh | Asset Owned | |
| 2 | Shree Maruti Paper & Chemicals Industries Ltd. | 610.4 | Birgunj, Madhesh | Asset Owned | |
| 3 | Nepal Hospitality and Hotel Private Limited | 23.76 | Kathmandu, Bagmati | Asset Owned | |
| 4 | Gham Urja Sewa Pvt. Ltd. | 504 | Kathmandu, Bagmati | RESCO | Soaltee Hotel Ltd |
| 5 | Simple Energy Pvt. Ltd. | 604.8 | Godar, Madhesh | RESCO | Bhudeo Khadhya Udyog |
| 6 | Simple Energy Pvt. Ltd | 601 | Birgunj, Madhesh | RESCO | Sarbottam Steels |
| 7 | Simple Energy Pvt. Ltd. | 600.6 | Bhadrapur, Koshi | RESCO | Jagadamba Tea Processing |
| 8 | Gham Urja Sewa Pvt. Ltd. | 422.4 | Parasi, Lumbini | RESCO | Kiran Shoes |
| 9 | Gham Urja Sewa Pvt. Ltd. | 514.8 | Gaindakot, Gandaki | RESCO | Saras Beverage |
| 10 | Simple Energy Pvt. Ltd. | 600.6 | Chitwan, Bagmati | RESCO | Yeti Brewery |
| 11 | Simple Energy Pvt. Ltd. | 369.6 | Sunsari, Koshi | RESCO | Premier Organics |
| 12 | Simple Energy Pvt. Ltd. | 534.8 | Birgunj, Madhesh | RESCO | South Asian Beverages |
| 13 | Gham Urja Sewa Pvt. Ltd. | 105.6 | Kathmandu, Bagmati | RESCO | Kathmandu Guest House |
| 14 | Gham Urja Sewa Pvt. Ltd. | 83.16 | Butwal, Lumbini | RESCO | Data Hub |
| 15 | Gham Urja Sewa Pvt. Ltd. | 924 | Nawalparasi, Lumbini | RESCO | Laxmi Steels |
| 16 | Gham Urja Sewa Pvt. Ltd. | 211.2 | Nepalgunj, Lumbini | RESCO | Soaltee Sibkrim Hotel |

| S.N. | NAME OF THE PROJECT DEVELOPER | CAPACITY (kWp) | LOCATION OF THE PROJECT | BUSINESS MODEL | OFF TAKER |
|---|---|---|---|---|---|
| 17 | Simple Energy Pvt. Ltd. | 56.28 | Lalitpur, Bagmati | RESCO | National Trust for Nature Conservation |
| 18 | Jayshree Company Pvt. Ltd. | 422.1 | Biratnagar, Koshi | Asset Owned | |
| 19 | Suryodaya Urja Private Limited | 302.08 | Bardaghat, Lumbini | Asset Owned | |
| 20 | Galaxy Packaging Pvt. Ltd | 400.4 | Bara, Madhesh | Asset Owned | |
| 21 | Everest Hospitality & Hotel Pvt. Ltd. | 125.4 | Kathmandu, Bagmati | Asset Owned | |
| 22 | Kabilas Hotel Private Limited | 71.28 | Bharatpur, Bagmati | Asset Owned | |
| 23 | Simple Energy Pvt. Ltd. | 670 | Sunsari, Koshi | RESCO | Maintawati |
| 24 | Simple Energy Pvt. Ltd. | 196.98 | Birgunj, Madhesh | RESCO | Global Automobile |
| 25 | Gauri Shankar Agro Industries Pvt. Ltd.* | 997.92 | Sunsari, Koshi | Asset Owned | |
| 26 | SPG Energy Pvt. Ltd.* | 600 | Duhabi,Koshi | RESCO | Shubha Laxmi Food Products Pvt. Ltd |
| 27 | Asian Biscuit And Confectionery Private Limited* | 670 | Duhabi,Koshi | Asset Owned | |
| 28 | Premier Wires Private Limited* | 1299.8 | Nimuwa,Koshi | Asset Owned | |
| 29 | Asian Thai Foods Private Limited* | 321.6 | Duhabi, Koshi | Asset Owned | |
| 30 | SPG Energy Pvt. Ltd.* | 635 | Prasauni - 06, Bara, Madhesh | RESCO | Jay Pashupatinath Synpacks Pvt. Ltd. |
| 31 | Simple Energy Pvt. Ltd.* | 402 | Morang, Koshi | RESCO | Alexa Technologies |
| **Total Capacity** | | **14,492** | | | |

*Projects under construction.

# Solar Surge : Catalysing Nepal's Rooftop Revolution

Nepal ' s industrial and SME sectors have historically faced high energy costs and unreliable electricity, often relying on diesel generators for backup. To address these challenges and promote sustainable energy, the Sustainable Energy Challenge Fund (SECF) launched targeted interventions to accelerate solar rooftop net-metering system adoption.

Rooftop Solar @ Saras Beverages

SECF ' s approach w as designed to address both supply and demand-side barriers through:

- V iability Gap Funding: Offering limited financial support (under 20%) via generation-based incentives and interest rate buy-downs.

- Risk Mitigation for Banks: Providing loan loss guarantees (up to 20%) to reduce perceived risks and encourage lending.

- Aw areness Campaigns: Building confidence among industries and SMEs in solar PV as a reliable, cost-effective solution.

This integrated approach strengthened solar companies ' investment capacity and incentivised banks to finance rooftop solar projects, fostering a robust market ecosystem.

The impact has been significant. For instance, Saras Beverages installed a 514.80 kW p rooftop solar system under the RESCO model, implemented by Gham Urja Pvt. Ltd. w ith SECF support. The system reduced diesel consumption from 900 to 500 liters weekly and now meets 70% of the factory ' s energy demand, w ith surplus power fed into the grid via net-metering, said Mr. Naresh P aneru, General Manager of the factory.

Beyond individual success stories, solar market growth has accelerated. A pproximately 26 MW of rooftop solar capacity has been installed w ith SECF support, and the AEPC has a pipeline exceeding 100 MW of solar projects seeking assistance. This growth has encouraged solar companies to scale their operations, w ith one reporting a fivefold increase in business volume w ithin three years, largely due to SECF ' s risk mitigation measures.

Leading financial institutions, including NMB Bank and Nabil Bank, now offer solar loan products w ith 100% financing, reducing upfront barriers for industries and SMEs. Investor confidence is rising, w ith hydropower investors and large business houses entering the solar sector, signaling strong future growth and diversification in Nepal ' s energy landscape.

# District wise Distribution of Solar Rooftop Projects


The figure shows the number of solar projects installed across the districts, including one ground-mounted captive solar project in Jhapa supported under the innovative window.

### 3.6.7 INNOVATIVE PROJECTS

The Innovative Projects Window of SECF was specifically designed to encourage and support initiatives that introduce emerging sectors, innovative business models, and cutting-edge technologies in Nepal's sustainable energy landscape. This window aims to demonstrate new concepts that have the potential to transform the energy market but may face initial financial, technical or other barriers. By providing targeted financial support, SECF helps reduce the risks associated with innovation, enabling private sector actors to experiment with novel approaches.

Total of 63 innovative projects were supported under this window. 53 projects were EV charging infrastructure in 41 districts of Nepal.

#### 3.6.7.1 EV CHARGING STATIONS

A total of 53 EV charging station projects including one battery as service system supported by the SECF have contributed to the development of a robust and growing EV charging network across Nepal. Through these projects, a total of 216 charging guns with a combined capacity of 8,840 kW (CCS-2 chargers) and 297 charging guns with a combined capacity of 13,240 kW (GBT chargers) have been installed in 132 locations across 43 districts. These installations have significantly enhanced the accessibility and reliability of EV charging services, reducing range anxiety among users and strengthening public confidence in electric mobility.

With SECF support amounting to NPR 352,363,454 (~USD 2,457,721), the private sector mobilised an additional NPR 383,430,339 (~USD 2,674,411) to develop EV charging stations, reflecting strong private sector enthusiasm in the e-mobility sector. This collaboration between SECF and private developers accelerated the nationwide deployment of charging infrastructure and demonstrated the effectiveness of viability gap funding in catalysing private investment in emerging clean energy markets. The resulting network of charging stations has showcased the commercial viability of the EV charging business, boosted user confidence, and encouraged greater private sector participation in the clean transport ecosystem, making SECF's support instrumental in advancing Nepal's transition toward sustainable mobility.

**Battery-as-a-Service (BaaS) Model** is an innovative business approach where users do not buy the battery outright but instead subscribe or pay for battery usage, swapping, or charging services. Under this model, the battery remains owned and managed by the service provider, while users pay based on energy consumption or usage duration.

This model helps reduce the upfront cost of EVs, making them more affordable, and ensures better battery maintenance, recycling, and performance monitoring. BaaS also enables quick battery swapping, minimising downtime and promoting the wider adoption of e-mobility solutions.

In some cases, SECF support has successfully primed innovative business models, such as battery swapping systems for electric scooters. One SECF-supported company, NEBULA, a start-up, initially established 12 battery swapping stations, with SECF sharing the early-stage business risk. This initial support helped demonstrate the technical and commercial viability of the model. Building on this success, NEBULA later expanded the network by an additional 33 battery swapping stations using its own investment. They are also planning to expand the similar battery swapping model in Pokhara and other cities in near future. This experience clearly illustrates how targeted, catalytic support from SECF can unlock private investment and enable the transition from pilot initiatives to commercially viable, scalable solutions.

## Table 7: List of SECF Supported EV Charging Station Projects

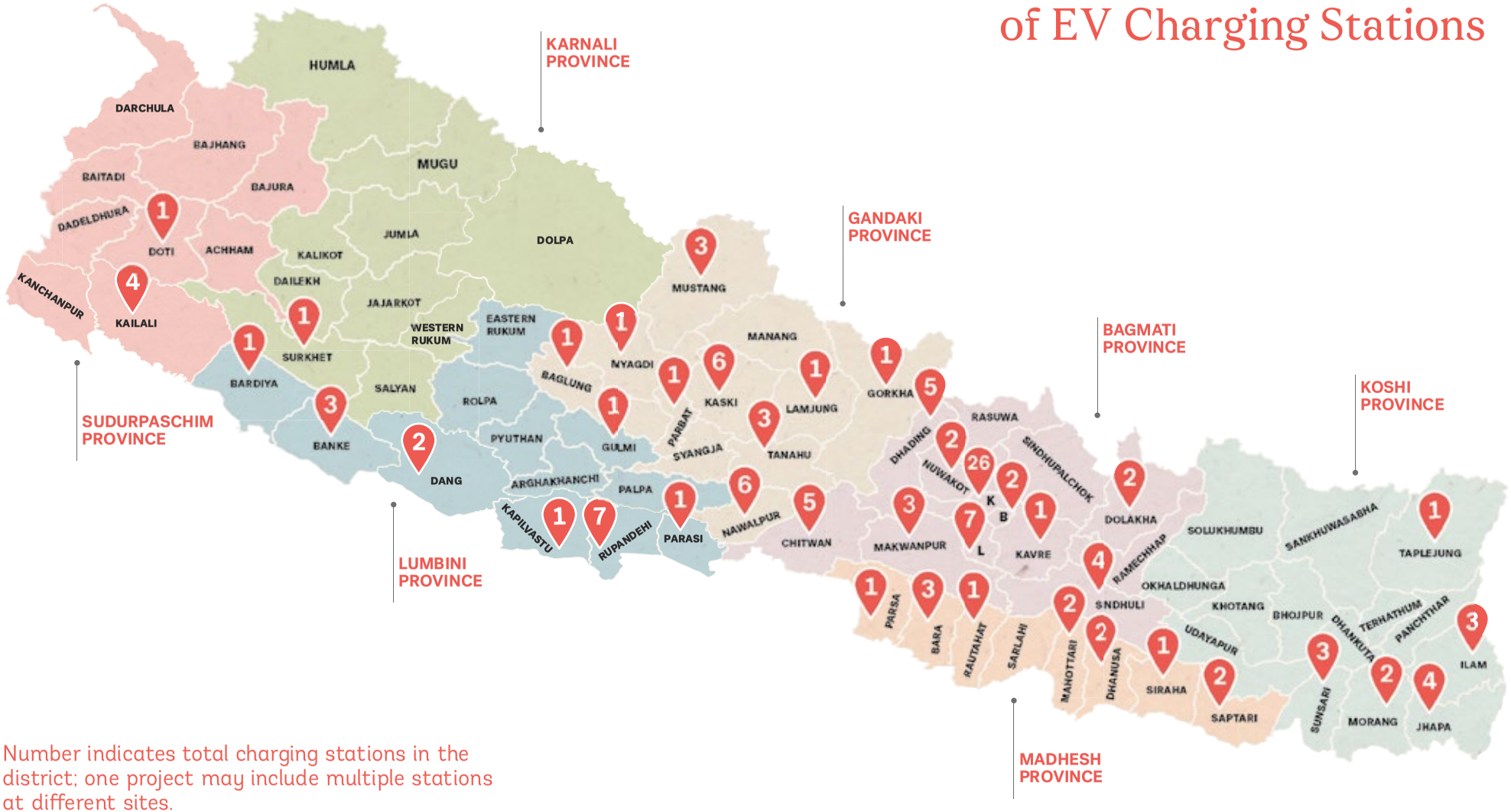
| S.N. | PROJECT DEVELOPER | PROJECT ADDRESS | PROVINCE | CCS 2 | | GBT | |
|---|---|---|---|---|---|---|---|
| | | | | kW (TOTAL) | TOTAL GUNS | kW (TOTAL) | TOTAL GUNS |
| 1 | E- Stop Nepal Pvt. Ltd. | Ramtar, Sindhuli, | Bagmati | 60 | 2 | 120 | 4 |
| 2 | E- Stop Nepal Pvt. Ltd. | Daldale, Nawalpur | Lumbini | 60 | 2 | 60 | 2 |
| 3 | Zivah International | Nawalparasi, Kailali, Kapilbastu, Sindhuli | Bagmati, Gandaki, Lumbini, Sudurpaschim | 240 | 8 | | |
| 4 | Nebula Mobility | Kathmandu, | Bagmati | | | | |
| 5 | Ecovus Construction | Gaidakot, Nawalpur | Bagmati | 80 | 2 | 480 | 12 |
| 6 | Shubhayan Motors | Butwal, Rupandehi | Lumbini | 160 | 2 | 360 | 6 |
| 7 | Nepal Ekarat Engineering | Hetauda, Makawanpur | Bagmati | 160 | 2 | 360 | 6 |
| 8 | D.G. Charging Station | Tharke, Dhading, | Bagmati | 160 | 4 | 360 | 6 |
| 9 | Sankalpa Multipurpose Company | Thimi, Bhaktapur | Bagmati | 160 | 4 | 360 | 6 |
| 10 | Sangam Shree* | Nepalthok, Kavre | Bagmati | 160 | 4 | 240 | 6 |
| 11 | Chainge Digital Pvt. Ltd. | Bhiman, Sindhuli | Bagmati | 160 | 4 | 240 | 6 |
| 12 | Chainge Digital Pvt. Ltd. | Pokhara, Kaski | Gandaki | 160 | 4 | 240 | 6 |
| 13 | Sangam Shree | Chabahil, Kathmandu | Bagmati | 160 | 4 | 240 | 6 |
| 14 | Saileshwari Group | Dipayal, Doti / Dhangadhi, Kailai | Sudurpaschim | 200 | 4 | 480 | 9 |
| 15 | Energy Environment Construction | Pokhara, Kaski | Gandaki | 160 | 4 | 360 | 6 |
| 16 | Shasheela Motors | Butwal, Rupandehi | Lumbini | | | 720 | 14 |
| 17 | Future Green* | Janakpur, Dhanusha | Madhesh | | | 160 | 4 |
| 18 | Chainge Digital Pvt. Ltd. | Samakhusi, Kathmandu | Bagmati | 160 | 4 | 240 | 6 |

| S.N. | PROJECT DEVELOPER | PROJECT ADDRESS | PROVINCE | CCS 2 | | GBT | |
|---|---|---|---|---|---|---|---|
| | | | | kW (TOTAL) | TOTAL GUNS | kW (TOTAL) | TOTAL GUNS |
| 19 | Future Green | Kanchanpur, Saptari | Madhesh | 60 | 2 | 80 | 2 |
| 20 | Future Green* | Pesicola, Bhaktapur | Bagmati | | | 80 | 4 |
| 21 | Future Green | Damak, Jhapa | Koshi | 160 | 4 | 280 | 6 |
| 22 | Future Green | Nepalgunj, Banke, | Lumbini | 160 | 4 | 280 | 6 |
| 23 | Future Green* | Dhangadhi, Kailali | Sudurpaschim | 160 | 4 | 280 | 6 |
| 24 | Future Green* | Chobar, Kathmandu | Bagmati | | | 160 | 4 |
| 25 | Chainge Digital Pvt. Ltd. | Nuwakot | Bagmati | 80 | 4 | 240 | 6 |
| 26 | Gadi Charge Koshi (12 Locations)* | | Koshi | 480 | 12 | | |
| 27 | Gadi Charge Madhesh (8 Locations)* | | Madhesh | 320 | 8 | | |
| 28 | Gadi Charge (13 Locations)* | | Bagmati | 520 | 13 | | |
| 29 | Gadi Charge Bagmati (11 Locations)* | | Bagmati | 440 | 11 | | |
| 30 | Gadi Charge Gandaki (12 Locations)* | | Gandaki | 480 | 12 | | |
| 31 | Gadi Charge Lumbini (9 Locations)* | | Lumbini | 360 | 9 | | |
| 32 | Sutantra Engineering Mokshya | Jamune, Myagdi, | Gandaki | 240 | 4 | 360 | 6 |
| 33 | Sutantra Engineering Mokshya | Malepatan, Kaski | Gandaki | 240 | 4 | 360 | 6 |
| 34 | Future Green | Itahari, Sunsari | Koshi | 160 | 4 | 280 | 6 |
| 35 | Future Green* | Hetauda, Makawanpur | Bagmati | 160 | 4 | 280 | 6 |
| 36 | Chainge Digital Pvt. Ltd. | Malekhu, Dhading | Bagmati | 160 | 4 | 240 | 6 |

| S.N. | PROJECT DEVELOPER | PROJECT ADDRESS | PROVINCE | CCS 2 | | GBT | |
|---|---|---|---|---|---|---|---|
| | | | | kW (TOTAL) | TOTAL GUNS | kW (TOTAL) | TOTAL GUNS |
| 37 | Chainge Digital Pvt. Ltd. | Sallaghari, Bhaktapur | Bagmati | 160 | 4 | 240 | 6 |
| 38 | Chainge Digital Pvt. Ltd. | Bardibas, Mahottari | Madhesh | 160 | 4 | 240 | 6 |
| 39 | Zivah International Kathmandu | Dhumbarahi, Kathmandu | Bagmati | 120 | 4 | 60 | 2 |
| 40 | C.G Motors Pvt. Ltd.* | Kalanki, Dharke, Kurintar, Damauli, Dumre and Pokhara | Bagmati, Gandaki | 0 | 0 | 1800 | 45 |
| 41 | Chainge Digital Pvt. Ltd. | Itahari, Sunsari | Koshi | 80 | 2 | 480 | 8 |
| 42 | Alliance Agro Tourism and Resort Pvt. Ltd. | Pathari Sanishchare, Morang | Koshi | 160 | 4 | 240 | 6 |
| 43 | Chainge Digital Pvt Ltd. | Attariya, Kailali | Sudurpaschim | 240 | 6 | 240 | 6 |
| 44 | Chainge Digital Pvt. Ltd.* | Damak, Jhapa, | Koshi | 0 | | 160 | 4 |
| 45 | Chainge Digital Pvt. Ltd. | Satdobato, Lalitpur | Bagmati | 160 | 4 | 240 | 6 |
| 46 | Chainge Digital Pvt. Ltd.* | Jorpati, Kathmandu | Bagmati | 160 | 4 | 240 | 6 |
| 47 | Chainge Digital Pvt. Ltd.* | Gaindakot, Nawalpur | Gandaki | 160 | 4 | 240 | 6 |
| 48 | Chainge Digital Pvt. Ltd.* | Kohalpur, Banke | Lumbini | 240 | 5 | 240 | 5 |
| 49 | Chainge Digital Pvt. Ltd.* | Lamahi, Dang | Lumbini | 240 | 5 | 240 | 5 |
| 50 | Chainge Digital Pvt. Ltd.* | Katari, Udayapur | Koshi | 240 | 5 | 240 | 5 |
| 51 | Chunky E-Spot* | Nijgadh, Bara | Madhesh | 60 | 2 | 80 | 2 |
| 52 | Shubhayaan Motors* | Wami Taksar, Gulmi | Lumbini | 80 | 2 | 160 | 4 |
| 53 | Shubhayaan Enterprises* | Chinchu, Surkhet | Karnali | 160 | 4 | 240 | 6 |
| **Total** | | | | **8,840** | **216** | **13,240** | **297** |

*Projects under construction.

# District wise Distribution of EV Charging Stations




Number indicates total charging stations in the district; one project may include multiple stations at different sites.

# Charging Stations: Backbone of E-mobility Growth

EV Charging Station @ Samakhusi, Kathmandu

SECF has made a significant contribution to promoting both public and private EVs in the country by supporting the establishment of 132 EV changing stations across the country. Several private sector players have now made investments of over NPR 383 M (USD2.7M) in this sector. One of the leading companies is Chainge Digital.

With a vision of "Empowering Electric Ecosystem," AirCharge (www.aircharged.com), managed by Chainge Digital Pvt. Ltd., is accelerating the adoption of electric vehicles by deploying a robust network of EV charging infrastructures across Nepal. AirCharge stations are strategically located in high-traffic corridors and key transit points including Attariya, Chitwan, Nuwakot, Pokhara, Malekhu, Sindhuli, Bardibas, Itahari, Kathmandu, Bhaktapur, Lalitpur, and Damak.

Each station is equipped with 10 charging guns supporting both GBT and CCS2 standards, offering up to 400 kW power-upgradeable to 800 kW. Both GBT and CCS2 guns deliver a maximum charging capacity of 250 kW, ensuring seamless, high-speed charging tailored to user requirements through advanced DC smart split charging technology.

AirCharge's initiative is a model of sustainability and climate action, directly generating 50 green jobs and more than 150 indirect employment opportunities. By deploying EV charging infrastructure across 11 locations, the network has the capacity to utilise 160 MWh of electricity daily, significantly reducing fossil fuel use and carbon emissions.

Supported by a proprietary mobile application and a comprehensive Charging Management System (CMS) called EI Charge, AirCharge enables users to access more than 200 charging guns through a single, user-friendly platform. This integrated digital ecosystem enhances convenience, transparency, and operational efficiency-further strengthening Nepal's transition toward sustainable mobility. Highlighting the company's digital-first approach, Mr. Bidhan Sharma, Managing Director of AirCharge, says: "Digital innovation and future skills are at the core of our work. We have developed innovative mobile applications and a comprehensive CMS to ensure operational transparency, efficiency, and scalability. These digital solutions not only streamline management but also set new standards for accountability and data-driven governance."

Looking ahead, AirCharge aims to expand its network to 500 charging guns by the end of the year and welcomes partnerships with stakeholders committed to advancing Nepal's electric vehicle ecosystem.

### 3.6.7.2 OTHER INNOVATIVE PROJECTS

#### Five Fuel Switching Projects

Out of the five fuel switching projects supported under innovative window, four projects are pioneering the use of biomass pellets and briquettes to meet industrial heat requirements, marking a significant milestone in Nepal's clean energy transition. These MSMEs previously relied on diesel, furnace oil, burnt lubricants, and coal for process heating—fuels that are both costly and environmentally harmful. With SECF support, these MSMEs have successfully transitioned to renewable biomass-based alternatives, demonstrating the technical and commercial viability of cleaner fuels in Nepal's industrial sector.

These four projects are implemented under the RESCO model; an innovative business approach that enables energy service providers to supply pellets and briquettes on a commercial basis, reducing the upfront investment burden on industries. This model represents a scalable solution for decarbonising industrial energy use while promoting entrepreneurship and local value creation in the renewable energy supply chain.

In addition, one MSME operating in the Everest region has established a dedicated bio-briquette and pellet production facility, replacing the use of expensive and imported LPG for cooking and space heating.

This initiative directly supports Nepal's national priorities under the Energy Development Roadmap and Nationally Determined Contributions (NDC 3.0)—both of which emphasise promoting clean energy technologies, reducing fossil fuel dependency, and fostering low-carbon industrial development. This is one area with high potential for scaling up in the future.

#### Solar Dryer Project

Astha Engineering, with support from SECF, has successfully installed 10 solar parabolic greenhouse dryers (with combined area of 2,500 square feet) in Palpa and Syangja. These dryers enable local farmers and cooperatives to process vegetables, spices, and fruits sustainably after harvest. In addition, Astha provides technical support for value addition and assists cooperatives in marketing their products. This innovative partnership model shows strong potential for replication in other regions, promoting the use of clean energy in agricultural processing and value chain development. More than 250 farmers (60% of them women) are benefiting from this initiative.

#### Hy-Pump for Irrigation Project

One of the projects supported under the innovative model is the Integrated Hypump-Turbine Lift Irrigation Project, implemented by aQysta Nepal Pvt. Ltd. in Rivan, Machhapuchhre Rural Municipality, Kaski. The system harnesses the kinetic energy of water from the tailrace of the Mardi Khola Hydropower Project to operate efficiently without external power. aQysta has partnered with 50 farmers, providing training on improved farming practices. This innovative approach links farmers directly to markets, helping them secure better prices for their produce.

#### Project on Solar Water Pump for Low-Income Group

Support Laghubitta Bittiya Sanstha Ltd. has facilitated the adoption of 100 solar-powered irrigation pumps by smallholder farmers in Koshi Province. This initiative aims to scale up solar irrigation solutions for farmers engaged in vegetable, fruit, fishery, and high-value cash crop production. By promoting green technologies, the project helps increase yields, stabilise incomes, enhance food security and nutrition, and empower smallholder farmers, especially rural women. Support Laghubitta also provided credit facilities to its members for purchasing these solar irrigation pumps.

## Bio CNG in Three Wheelers Project

SECF supported KP Byabasaya in Surkhet to explore a creative idea, using biogas generated from municipal waste to power three-wheelers. The project has two goals. First goal was to demonstrate how use of bio CNG in three wheelers could financially be attractive for the three-wheeler owners. The second goal was to make the biogas plant financially feasible by selling the bio CNG.

But while the idea was promising, the project could only convert 12 three-wheelers to bio-CNG, and it did not achieve the scale that had been envisioned. A number of challenges held it back. The municipal waste supply was not consistent enough to produce the required amount of gas. The purity of the gas also fluctuated which caused performance issues in the vehicles. Skilled technicians who could install and maintain the system were hard to find. And importantly, many tempo owners were hesitant to switch to bio-CNG because they were unsure about the reliability of the new system and worried about potential maintenance costs.

Together, these issues made it difficult for the project to grow beyond the pilot stage, even though the underlying idea remained innovative and valuable.

## Captive Solar PV Project with Double Axis Tracking

Eco Renewable Private Limited has installed a 284.58 kWp solar project featuring a two-axis sun tracking system, the first of its kind in Nepal. Located at Hotel Mechi Crown in Mechinagar, Jhapa, the system supplies clean electricity to the hotel while integrating agro-photovoltaic features that allow crop cultivation beneath the solar panels. The advanced two-axis tracking mechanism combined with bi-facial modules increases total energy generation by 10–15%, depending on climatic conditions.

## Table 8: List of Other Innovative Projects

| S.N. | NAME OF THE PROJECT DEVELOPER | TECHNOLOGY | kW | HH | MSMEs | BIO CNG TEMPOS | LOCATION OF THE PROJECT | OFF TAKER |
|---|---|---|---|---|---|---|---|---|
| 1 | K P Byabasayik Sewa Pvt. Ltd. | Bio-CNG | | | | 12 | Surkhet | |
| 2 | Khumbu Agro Farm and Research Centre Pvt. Ltd. | Pellet/Briquette Production | | 50 | 50 | | Khumbu Pasanglhamu, Solukhumbu | |
| 3 | aQysta Nepal Pvt. Ltd. | Hydro-Powered Irrigation | | 50 | | | Machhapuchhre Rural Municipality 5, Rivan | |
| 4 | Support Laghubitta Bittiya Sanstha Ltd. | Solar water Pump | | 100 | | | Morang, Sunsari and Udayapur | |
| 5 | Aastha Engineering Solution Pvt. Ltd. | Solar Green House Dryer | | | 2 | | Palpa and Syanja, Waling | |
| 6 | Janda Devi Nepal Energy Pvt. Ltd. | Biomass Pellet Burners | | | 1 | | Sukedhara-4, Kathmandu | Elite Wires Pvt Ltd |
| 7 | Smart Tech Agro & Bio Energy Pvt. Ltd. | Biomass Pellet Burners | | | 7 | | Kathmandu, Lalitpur and Bhaktapur | |
| 8 | Janda Devi Nepal Energy Pvt. Ltd. | Biomass Pellet Burners | | | 1 | | Chabahil, Kathmandu | Salabmu Chips Udhyog |
| 9 | Eco Renewable Private Limited | Solar Photovoltaics grid tied | 284.6 | | | | Jhapa, Koshi | Hotel Mechi Crown |
| 10 | Smart Tech Agro & Bio Energy Pvt. Ltd. | Biomass Pellet Burners | | | 4 | | Kailali, Lalitpur, Tanahu, Dhanusha | |
| | **Total** | | **284.6** | **200** | **65** | **12** | | |

# No Upfront Cost : Making Clean Energy Affordable for Industries

Pellet Burner @ Salambu Chips, Kathmandu

Industrial process heating in Nepal has long depended on costly, polluting fuels like diesel and LPG, creating a major barrier for MSMEs to adopt cleaner technologies due to high upfront costs. Janda Devi Nepal Energy Pvt. Ltd. (JDNE) disrupted this challenge with its Renewable Energy Service Company (RESCO) model-a game-changing approach that delivers sustainable energy solutions with zero capital investment from clients.

Supported by SECF, JDNE deployed biomass pellet burner systems at Elite Wires and Salambu Chips, demonstrating that clean energy can be both affordable and profitable. Under the RESCO model, JDNE installs, operates, and maintains the systems, while industries pay through predictable service-based contracts. This converts energy from a risky capital expense into a manageable operating cost, ensuring long-term client retention and recurring revenue streams. "We guarantee reliable, cost-effective, and sustainable energy," says Mr. Kadam Mani Nepal, JDNE.

The impact is clear. Salambu Chips cut energy costs by 25%, improved product quality, and eliminated upfront investment. Elite Wires replaced 900 kg of LPG daily with 2,520 kg of locally produced biomass pellets, reducing reliance on imports and securing cleaner, high-temperature heating. "The RESCO model was a gamechanger. We didn't pay upfront, and now we save significantly on fuel costs," says Mr. Hari Dulal, Managing Director of Salambu Chips.

For investors, the RESCO model represents a scalable, high-impact business opportunity. It addresses a critical pain point for MSMEs, leverages locally sourced biomass, and creates a recurring revenue model with strong environmental and economic benefits. Similar service-based models are already transforming solar PV adoption in Nepal-JDNE is bringing that success to industrial heating in Nepal.

### 3.6.8 LOAN LOSS GUARANTEE

Another SECF Window is Loan Loss Guarantee. Following eight banks have partnered with AEPC under the LLG Window.

Out of these banks, five have already financed 29 DSE projects under this scheme. Initially the banks were hesitant to invest in DSE projects. With the provision of LLG, their perceived risk in financing DSE projects was reduced. Various capacity development events such as orientation programmes and match making events with project developers helped build confidence. Some of the banks have developed new solar loan products, established sustainable banking departments and even offered loans up to 100% of the project cost for solar projects.

The financing of BFIs has increased in DSE (based on different technologies) which has ultimately increased technical and financial due-diligence capacity of the BFIs apart from hydropower projects. This is because of orientation, training and loan loss guarantee by SCEF to minimise the risk in the beginning of DSE financing.

# Demonstrated Economic and Climate Impact: A Proven Model for GCF Investment

The Nepal Renewable Energy Programme, delivered between 2019 and 2025 with UK government support, has shown what's possible when public funding is used strategically to expand access to clean energy in low-income settings. Combining technical assistance, policy engagement, and catalytic funding, SECF helped bring distributed sustainable energy services to communities, businesses, and institutions across Nepal that had long been underserved.

Independent economic modelling confirms that NREP delivered real and lasting gains for the economy, jobs, and local resilience. During implementation, the programme added an average of USD 3.22 million to Nepal's GDP each year and supported around 91 full-time equivalent jobs annually. From 2025 onwards, as more businesses and households make use of clean energy, that annual GDP impact is expected to grow to USD 6.03 million, supporting about 576 jobs each year.

For every dollar spent during the programme, Nepal gained nearly twice that in economic value. Over the expected 20-year lifespan of the renewable energy systems deployed, the return is projected to increase to 11 to 1. These figures are conservative because they reflect only formal economic impacts and do not include the value of avoided emissions, improved household wellbeing, or strengthened institutions.

NREP's achievements show that well designed, country led energy programmes can deliver high impact outcomes that align directly with GCF priorities. The model delivered:

- Increased renewable energy use by both businesses and households through access to on-grid and off-grid clean energy solutions for rural households, micro-enterprises, and public facilities
- Tangible economic growth, job creation, and improved productivity
- Strong local ownership through partnership with government institutions and community groups
- A platform for de-risking private sector investment in clean infrastructure
- Policy and market reforms that strengthened the long-term sustainability of Nepal's energy transition

GCF investment can build on this proven foundation. A follow-on phase could extend access to remote and under-served areas, mobilise greater flows of private capital, and deliver benefits that cut across climate, development, and resilience goals.

With GCF support, this tested model can go further, embedded in national systems, scaled for greater impact, and central to a clean energy transition that is inclusive, lasting, and good for the economy.


IN PHOTO

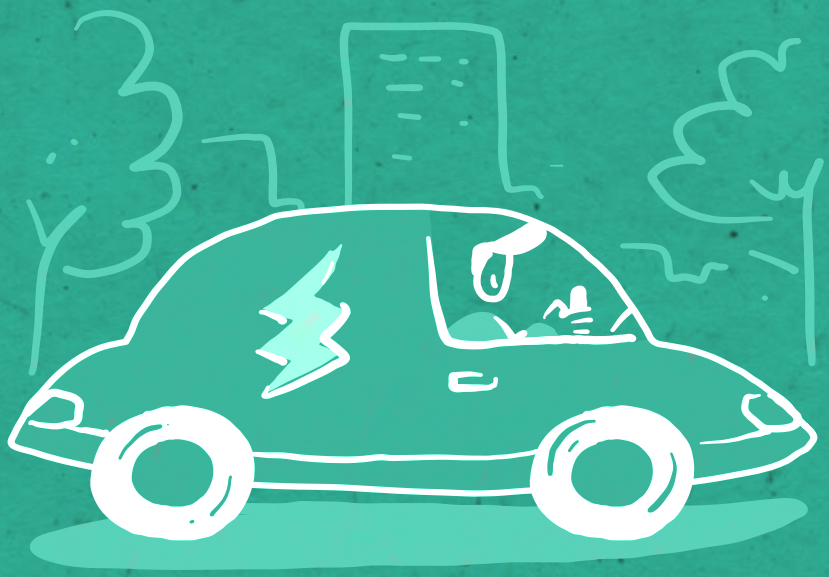
*EV Charging Station at Hetauda*

IN PHOTO

*Carrying Penstock Pipes for Amadablam Mini Hydro Project*

# 4

# Lessons, Challenges and Way Forward



# 4 Lessons, Challenges and Way Forward

## 4.1 Key Lessons

SECF has demonstrated that well-structured, market-based financing mechanisms can successfully mobilise private sector investment in DSE projects. Once operationalised, SECF catalysed large-scale investment in rooftop solar, electric cooking, electric mobility, and fuel switching. It has also demonstrated that VGF can work effectively in Nepal's renewable energy sector when supported by strong institutional ownership and sustained technical assistance.

### KEY LESSONS LEARNT ARE:

- The overwhelming response to SECF calls from the private sector confirmed the need for such a blended financing mechanism to accelerate clean energy investment in Nepal. Its institutionalisation within the GoN framework, under the CREF, has enhanced government commitment to renewable energy financing and ensured the SECF's sustainability beyond the NREP project period.
- Open and transparent project selection processes have also strengthened confidence among development partners to channel financial assistance through SECF.
- The VGF approach enhanced both the confidence and capacity of private developers to invest in and of BFIs to lend to renewable energy projects. However, the SECF's experience also showed that financing support alone is insufficient. Many applicants require substantial technical assistance to prepare bankable proposals, meet due diligence standards, and comply with environmental and social safeguards. The technical assistance provided by NREP and REEEP-GREEN throughout the project cycle, particularly to women-led enterprises and rural cooperatives, was instrumental in ensuring project quality and timely delivery.
- SECF experience revealed that not all risks can be mitigated through technical assistance or flexible financing. Some projects, such as Amadablam mini-hydro, encountered challenges beyond programme control, including private equity mobilisation difficulties, challenges due to extreme cold weather, and site-specific permitting issues.
- Overall, SECF's implementation highlighted that successful market-based approaches require strong coordination and adaptive management, as well as supportive policy, institutional and infrastructure ecosystem.
- Another key learning was the importance of generating and disseminating data, lessons, and success stories throughout the programme, not only at its conclusion. Earlier visibility of initial results could have accelerated investor confidence and private sector participation in viability gap funding windows.
- From a market development perspective, SECF's experience in electric cooking and e-mobility showed that adoption of new technologies depends not only on financing but also on ecosystem readiness. Demand-side interventions through MFIs/LFIs helped promote electric cooking solutions among rural households, especially women, but grid reliability and distribution capacity in provinces like Karnali remained key barriers. Similarly, the strong interest in EV charging infrastructure was tempered by challenges in land acquisition, electricity supply, permitting, and inter-agency coordination.
- SECF approached projects from an investment perspective rather than a subsidy-driven one. Rigorous due diligence was conducted on both applicants and projects, and only those that achieved financial closure were approved for support and all payments were tied to results. These principles and practices have been key success factors contributing to SECF's credibility, effectiveness, and sustainability.

## 4.2 Key Challenges

The challenges faced during the implementation of SECF are categorised into following two categories:

### EXTERNAL AND SYSTEMIC LEVEL CHALLENGES

- A major constraint during implementation was the delay in SECF's full operationalisation until April 2023, caused by early-stage design refinements, prolonged approval processes, and the impacts of the COVID-19 pandemic. Despite these delays, the later years of implementation demonstrated the SECF's transformational potential, with 147 projects approved and significant private sector engagement achieved.
- The funding support from BEK concluded at a time when market demand for SECF financing was at its peak. A subsequent budget cut interrupted the momentum that had been built. Moreover, due to the economic slowdown in the country, the GoN was unable to allocate sufficient resources to continue the funding mechanism at the desired scale.
- Nepal's fragile economic environment, especially post-COVID, reduced private sector confidence so several projects were discontinued even after the approval from the IC.
- Despite the GoN's strong priority on last-mile electrification, market-based mechanisms like SECF are not well-suited to attract private investors to remote and underserved areas, where the cost-of-service delivery is high and financial returns are limited.
- As per the NEA decision, net metering of solar projects was done for projects up to 500 kW capacity. There is a high demand for net metering of the projects up to 1 MW. This has been a challenge for promoting rooftop projects in industries with high electricity need.

### OPERATIONAL LEVEL CHALLENGES

- The documentation requirements were extensive. Many applicants suggested that required documents should be reviewed and streamlined.
- The overall evaluation process of the SECF applications took longer than initially anticipated. However, the impressive success rate of approved projects demonstrated that the rigorous approach was worthwhile. For future calls, the document requirements and review procedures could be streamlined to maintain quality while improving efficiency.
- Balancing the need for swift processing of applications with the requirement for thorough assessment to select high-quality projects was a challenge.

## 4.3 Way Forward

SECF has been designed and institutionalised within the government mechanism, ensuring ownership from the GoN. AEPC envisions SECF as a mainstream support mechanism for Nepal's DSE sector in the evolving context. Once the Renewable Energy and Energy Efficiency Bill is approved, it will further strengthen the institutional foundation for the continuation and scaling up of SECF.

### SUSTAINABILITY STRATEGIES

The following strategies shall be adopted for the sustainability of SECF.

**SHORT-TERM STRATEGIES:** Short-term strategies are proposed for the period up to next 5 years.

- **Collaboration with DPs to support projects in the SECF pipeline**

  Total of 142 projects are currently in the SECF pipeline but have been put on hold due to the unavailability of sufficient funds and limited remaining implementation time under the NREP. These pipeline projects represent significant potential for scaling up DSE initiatives across the country. The total expected investment mobilisation from these projects is estimated at over NPR 3.6 billion, indicating a strong appetite among investors and developers for clean energy ventures when appropriate financing mechanisms are in place.

  Given the demonstrated success and credibility of the SECF model, it would be both timely and strategic to explore partnerships with DPs (both bilateral and multilateral agencies) currently supporting the DSE sector in Nepal. Such collaboration could ensure that these high-impact projects are implemented through continued SECF support, thereby sustaining the momentum built under NREP. Mobilising additional resources through pooled or blended financing arrangements would help unlock these investments, expand access to renewable energy, and further strengthen Nepal's clean energy transition.

- **Expanding SECF support in new areas**

  Energy efficiency remains a key priority for promoting sustainable energy practices in Nepal. In addition, there are significant opportunities to utilise surplus electricity productively, particularly within digitalisation, agriculture and eco-tourism value chains. There is a need of having specific window to support the EE initiatives in commercial and industrial sectors which could further enhance the SECF's relevance, impact, and long-term sustainability.

- **Scaling up supports in high impact areas**

  SECF has supported the high impact projects in the DSE sector. This should be scaled up so that it can contribute significantly to national priorities.

- **Utilisation of Carbon Revenue and fossil fuel use tax in SECF**

  AEPC has developed several Carbon projects and earned Carbon revenue. Some of the funds can be mobilised through specific budget subheading created for SECF by GoN to scale up the DSE interventions in the country. Similarly, part of the fossil fuel use tax can be mobilised through SECF. This will encourage fuel-switching initiatives in industries, which can play a major role in advancing energy transition while reducing the country's reliance on imported fossil fuels and increasing utilisation of sustainably produced biomass and surplus electricity domestically.

- **Appropriate policy provisions**
  - SECF support for EV charging stations has been instrumental in significantly upscaling charging infrastructure across Nepal, facilitating wider adoption of electric vehicles. A key barrier to the commercial viability of charging stations remains the 20% ceiling on the electricity tariff margin above the purchase price of electricity by the charging stations. Once this ceiling is removed, the need for SECF support may be gradually reduced. Efforts need to be made for developing the EV charging stations guidelines including to define the standards, operational modalities and lift the 20% ceiling to enable a fully sustainable and market-driven EV charging sector.
  - Defining the tariff for battery stored electricity would encourage the project developers to design such projects, which would be very crucial for the peak management and utilisation of electricity in off hours. This will also expand the scope of SECF in the area of energy security.
  - System improvement of micro-hydro projects and their grid connection not only provide the high-quality electricity to the rural households and enterprises but also improves the voltage of grid supply around that area. In areas without immediate plans for national grid expansion, improvement of MHPs can have a high impact on last-mile electrification and contribute significantly to the national priority of providing quality electricity access for all. Most of the MHPs in Nepal are still being managed and operated by MHP User Committees. CREF OM should be reviewed and updated to allow MHP User Committees, which are also registered in PAN and renewed regularly to develop the MHP system improvement with SECF.
- **Embedding long-term technical assistance:**

  Technical assistance capacity and necessary resources should be institutionalised within AEPC and CREF to strengthen project preparation, financial structuring, project monitoring and compliance with environmental and social safeguards.

**LONG-TERM STRATEGIES:** The following long term strategies can be followed for the sustainability of SECF.

- **Allocation of regular government budget**

  In the long run, SECF should be fully institutionalised and operationalised through regular government budget allocations, gradually reducing dependency on DPs' grants. Embedding SECF within the national financing framework will enhance its sustainability, predictability, and credibility. This approach will also enable the GoN to strategically mobilise domestic resources and align fund utilisation with national priorities.

  GoN has already created a budget activity for SECF in a specific budget sub-heading. Given the current financial constraints and political instability, the GoN has recommended that programmes supported by DPs continue under existing funding arrangements in the immediate term to ensure continuity. However, GoN will further explore the possibility of allocating regular GoN resources for sustainability of such initiatives in the future. This reflects the government's growing commitment to institutionalising successful, market-based financing mechanisms like SECF and gradually transitioning them towards national ownership and fiscal sustainability.

> So far, loans mobilised for SECF-supported projects amount to over NPR 2 billion. If CREF had provided this loan amount to the participating BFIs with a minimum interest margin of 1% per annum, the annual revenue for CREF would have exceeded NPR 20 million. This revenue would have been sufficient to cover CREF's operational costs, ensuring its financial sustainability while continuing to promote investment in renewable energy and energy efficiency projects.

- **Institutionalising fund mechanism within the framework of upcoming Renewable Energy and Energy Efficiency Act**

  The Renewable Energy and Energy Efficiency Bill has recognised the SECF, paving the way for its institutionalisation under the forthcoming Renewable Energy and Energy Efficiency Act. In line with this mandate, CREF should broaden its concessional financing portfolio to provide loan funds to participating BFIs that finance SECF-supported projects.

- **Scaling up SECF with the Green Bank Model with international climate fund and other innovative financial instruments like Green Bonds**

  Expand SECF through pooled climate finance resources, such as the GCF, to mobilise greater volumes of private investment in DSE sector, potentially incorporating a Green Bank Model to enhance leverage and sustainability.

  Similarly, issuance of Green Bond can also be explored for the sustainability of SECF.

- **Gradual phasing out of SECF supports for the technologies approaching commercial viability.**

  Over the implementation of several SECF supported projects, some technologies are approaching commercial viability. This should be reviewed and SECF support should be gradually phased out for the technologies nearing commercial viability.

**In conclusion,** SECF has demonstrated to be an effective instrument for unlocking private sector investment in Nepal's DSE sector. With continued institutional support, strategic partnerships, and scaled-up financing, the SECF can play a pivotal role in accelerating Nepal's transition towards a clean, inclusive and sustainable energy future.

IN PHOTO

*Fish Farming with SECF Promoted Solar Irrigation Project*

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