Alternative Energy Promotion Centre
National Rural & Renewable Energy Programme

Foreword

Without the abundant access of energy, development takes the back seat. And, long term sustainable development is not possible without the development of sustainable energy technologies. In spite of having huge hydro energy potential, Nepal faces severe energy crisis leading to long hours of power cuts which have stalled the economy at large. Today, the bitter reality in a country is that our industries, businesses and households are heavily relying on fossil fuels as alternative energy sources while in the other hand we have multiple renewable energy options that are either underutilized or are often overlooked.

At this same time, Nepal also confronts the challenges of poverty, issues of gender and social inclusion and issues of climate change all at the same time. Promotion of renewable energy technologies has been one of the indispensible tools to overcome these challenges. Alternative Energy Promotion Centre (AEPC), since its very establishment has been promoting sustainable energy solutions to off-grid rural households and communities in Nepal who primarily lack electricity to light their homes or burning polluting fuels either for their lighting or cooking needs or to run their local enterprises and businesses. More recently, AEPC has also been promoting solar options to urban areas in an effort to lessen the burden of energy demand from the grid electricity. This booklet provides a broad overview of all these activities.

Government of Nepal has also recently come up with “Clean Cooking and Lighting Solutions for All” by 2017, which now requires an improved dialogue and discussions between academia, public, private sector, civil society and development partners alike. As the Executive Director of AEPC, I assure that Alternative Energy Promotion Centre continues to offer its knowledge, expertise and commitment to take new steps towards the more sustained growth of renewable energy sector in Nepal. Diffusion and development of renewable energy sector to the level expected to contribute both to meet the energy demand in the country while also contributing to nation economy is however unlikely to happen without all of us working together and taking the initiatives from every front.

Ram Prasad Dhital
Executive Director
Alternative Energy Promotion Centre

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Alternative Energy Promotion Centre (AEPC)

Renewable Energy in Nepal

There are still over four million households out of about five and half million households that still need access to clean energy options for cooking, lighting and heating in Nepal.

The energy mix pattern of Nepal shows that 87.1 per cent of the total energy comes from fuel wood. Fuel wood does not provide the type of energy required for working, reading, communication and other basic services essential for improved quality of life. The rural population needs reliable and sustainable sources of energy for two basic reasons: to foster decentralised economic growth and, to build the resilience of communities in the face of climate-induced disasters by promoting income diversification both away-from the farm and within. Recent AEPC's studies show that energy scenarios that consider both mitigation and adaptation needs have indicated that there will be a huge of energy demand.

	Total Households	Firewood	Cowdung	Firewood+Cow Dung
Nepal	5,423,297	3,470,224	563,126	4,033,350
% Share		64.0%	10.4%	74.4%
Mountain	363,698	344,843	1,517	346,360
Hill	2,532,041	1,696,376	2,810	1,699,186
Terai	2,527,558	1,429,005	558,799	1,987,804

Source: National Population and Housing Census 2011 (National Report). CBS, 2012

Nepal has diversified structure of land from plains to high himalayas. The settlement pattern is scattered and sparse. Electricity from national grid is not feasible in some of the places. Big projects need huge investment which can be the economic burden for the country. Due to these factors, Nepal's most viable option for fulfilling energy needs is through use of the renewable energy sources available in country. Appropriate and localized solutions for remote

areas in Nepal will also help to reduce the dependence on biomass energy sources and fossil fuel, while reducing energy crisis of the nation. This ultimately helps to minimize the degradation of the environment.

Use of Renewable Energy Technologies (RETs) can reduce the dependency on traditional energy and help to protect the environment and reduction of emission of greenhouse gases, contribute to sustainable development, regional balance and increase economic activities. It ultimately contributes to improve the health and educational status of the population as well. However, the potential has not been exploited to the fullest.

Alternative Energy Promotion Centre (AEPC) was established on November 3, 1996 by the Government of Nepal with the objective of promotion, development and expansion of renewable/alternative energy technologies in the country. Currently, AEPC is under the Ministry of Science, Technology and Environment and is working as a national focal agency for alternative/renewable energy in Nepal.

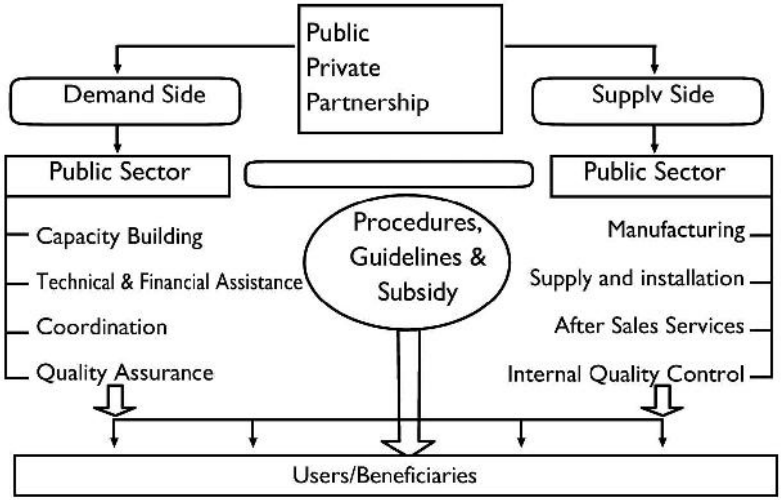
AEPC's Vision

An institution recognised as an international example of promoting large-scale use of renewable energy sustainable and a national focal point for resource mobilisation in the sector.

Approach

Public Private Partnership

AEPC works collaborating with the various partners like ministries and its departments, non-governmental organisations, private sector, civil society and community/users groups for the development and promotion of RETs in the country.



AEPC follows the Public Private Partnership Model and Demand Based Approach. Public sector works for the capacity building, technical and financial assistance, coordination, quality assurance etc. and private sector works for manufacturing, supply and installation, and after sales services.

AEPC ensures outreach through engagement of local bodies, sub-national and national service providers and private sector. Capacity development of local government bodies has been emphasised through engagement of DDCs in all the 75 districts of the country for demand collection, coordination, implementation, monitoring and supervision of RETs and programs, with complimenting support from Regional Service Centres across Nepal. Pre-qualified (PQ) companies are involved in manufacturing, supply, installation and after sales services. There are separate PQ companies for different RETs and the subsidy is channelized only through such companies.

Single Programme Modality

The Government of Nepal (GoN) and a number of Development Partners have for many years supported the rural and renewable energy sector in Nepal through various projects and programmes implemented through AEPC. The GoN, together with national, bilateral and multilateral development partners have realised the need for a more coherent and coordinated approach while working in renewable energy sector in Nepal. As such, the National Rural Renewable Energy Programme (NRREP) has been formed, supported and is currently under implementation as a single programme modality for support to the renewable energy sector. AEPC is committed to attract additional development partners to implement NRREP and avoid parallel implementation structures.

National Rural and Renewable Energy Programme (NRREP)

Evolution

AEPC has hosted different project interventions through support from development partners in the past. Especially, the second phase of the Energy Sector Assistance Program (ESAP II) followed a more coherent and coordinated approach that led towards realisation of the need of a more coordinated sector development. As its result, in 2011, the GoN and development partners jointly agreed to support formulation of a National Rural and Renewable Energy Programme (NRREP).

Salient Features

- Starting date: 16 July 2012
- Duration: 5 years
- Budget: USD 184 Million
- NRREP is supported by various bilateral and multilateral Development Partners, including but not limited to Danida, Norwegian Ministry of Foreign Affairs, DFID, KfW, GIZ, SNV, UNDP, ADB, World Bank and the SREP. Additional development partners can support to the NRREP in future.
- NRREP is Government of Nepal (GoN) endorsed single programme modality for Renewable Energy sector development. NRREP takes-up the best practices and lessons from the past and consists of financial resources, technical assistance and capacity building.
- The NRREP is firmly aligned to the existing and evolving GoN policy framework.
- The programme follows the GoN subsidy policy and delivery mechanisms. Its Monitoring and Evaluation systems are aligned towards the GoN monitoring requirements.
- The NRREP adopts a strong focus on poverty reduction and attempts to strongly address Gender Equality and Social Inclusion in the programme.
- The NRREP envisions positive effects on environment and climate change in Nepal with due focus to increase and maximize carbon market revenue.

- Democratisation and good governance are addressed in different ways into the program. It works in coordination/ collaboration with District Development Committees, Regional Service Centres, local organisations and companies following to ensure effective outreach .
- The overall management of NRREP is carried out by the Program Steering Committee. With AEPC being the executing agency, the NRREP Program Director is the xecutive Director of AEPC.

Program Results/Targets		
1.	Mini and Micro Hydro power	25,000 kW
2.	Households benefiting from the community electrifications	150, 000
3.	Solar Home Systems	600,000
4.	Institutional Solor PowerSystem	1,500
5.	Improved Cooking Stoves	475,000
6.	Household Biogas systems	130,000
7.	New MSMEs establishment	1,300
8.	Employment increased byMSMEs	19,000
9.	AEPC is recognised as an effective and efficient institution for development of the Renewable Energy sector.	

- NRREP operates through 3 main components namely Central Renewable Energy Fund (CREF), Technical support (TS) and Business Development for Renewable Energy and Productive Energy Use (PEU). Components are divided into subcomponents. Each component/sub-component is managed by a team led by a component manager and the team is supported by an Advisor.

Development Objective

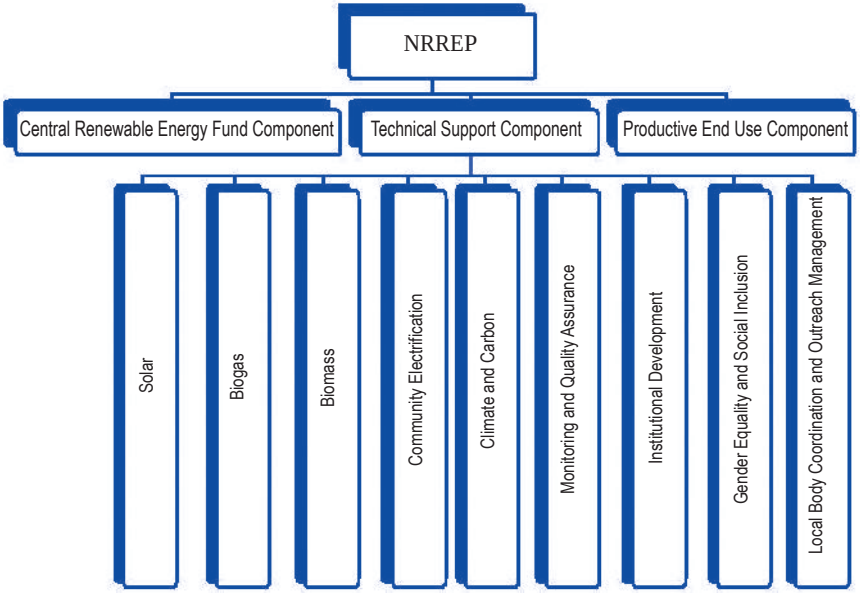
To improve the living standard of rural women and men, increase employment of women and men as well as productivity, reduce dependency on traditional energy and attain sustainable development through integrating the alternative energy with the socioeconomic activities of women and men in rural communities.

Programme Components

1) Central Renewable Energy Fund (CREF) Component: The main objective of this component is to institute the CREF as the core financial institution responsible for the effective delivery of subsidies and credit support to the renewable energy sector. It will deliver 2 outputs related to sector cooperation and subsidy systems.

2) Technical Support Component: This component is an array of various sub components. Its main objective is to accelerate renewable energy service delivery with better quality, comprising various technologies, to remote rural households, enterprises and communities, to benefit men and women from all social groups, leading to more equitable economic growth. It will deliver 17 outputs related to technology promotion, climate change and carbon, institutional development, outreach, monitoring and gender and social inclusion.

3) Business Development for Renewable Energy and Productive Energy Use Component: Main objective of this component is to contribute to increase income and employment generation potential for micro, small and medium sized enterprises in rural areas, particularly for men and women belonging to socially and economically disadvantaged groups. It will deliver 3 outputs related to capacity of MSME's, innovations on MSMEs and appropriate business development.



Subsidy

The exploitation of various sources of renewable (rural/alternative) energies like biogas, mini/micro hydro, solar energy, wind energy, biomass energy, etc. has great potentiality in Nepal. GoN has established Alternative Energy Promotion Centre (AEPC) with the objective of promotion and development of renewable energy technologies for improving the living standards of rural people, environment conservation and sustainable development of rural areas. Considering these facts GoN has been providing subsidy to renewable energy technologies with focus in rural areas. The Subsidy Policy for Renewable Energy, 2069 aims to reach out to more remote and poorest parts of the country while mainstreaming gender and social inclusion in decision making to support the productive use of energy for rural employment generation and economic growth. The following tables summarises the subsidy provisions, there are explicit gender and social based additional subsidy in each categories.

1. Mini and Micro Hydro Power and Improved Water Mill

Community/cooperative owned mini hydro (off-grid from 100 kW to 1000 kW)

Subsidy category	Subsidy Amount		
	Category "A" VDCs	Category "B" VDCs	Category "C" VDCs
Subsidy per Household	Rs. 20,000	Rs. 18,000	Rs. 16,000
Subsidy per kW	Rs. 120,000	Rs. 100,000	Rs. 70,000

Maximum subsidy amount per kW including household subsidy will not exceed Rs. 220,000, Rs. 190,000 and Rs. 170,000 for category 'A', category 'B' and category 'C' VDCs respectively.

Mini Hydro connected to Grid

The subsidy amount for household to be connected to grid will be Rs. 15,000.

Micro Hydro Power (10 kW to 100 kW)

Subsidy category	Subsidy Amount		
	Category "A" VDCs	Category "B" VDCs	Category "C" VDCs
Subsidy per Household	Rs. 25,000	Rs. 25,000	Rs. 25,000
Subsidy per kW	Rs. 130,000	Rs. 100,000	Rs. 70,000

Maximum subsidy amount per kW including household subsidy will not exceed Rs. 255,000, Rs. 225,000 and Rs. 195,000 for category 'A', category 'B' and category 'C' VDCs respectively. On the basis of possibility of use of the electricity in the productive end use, subsidy for additional one kilowatt per household (maximum of 5 households) will be provided.

Pico Hydro Power (Below 10 kW)

Subsidy category	Subsidy Amount		
	Category "A" VDCs	Category "B" VDCs	Category "C" VDCs
Subsidy per Household	Rs. 15,000	Rs. 15,000	Rs. 15,000
Subsidy per kW	Rs. 90,000	Rs. 80,000	Rs. 60,000

The maximum subsidy amount per kW will not exceed Rs. 165,000, Rs. 150,000 and Rs. 135,000 in category "A", category "B" and category "C" VDCs respectively.

Improved Water Mill

Subsidy category	Subsidy Amount		
	Category "A" VDCs	Category "B" VDCs	Category "C" VDCs
Short Shaft	Rs. 20,000	Rs. 18,000	Rs. 16,000
Long Shaft	Rs. 40,000	Rs. 38,000	Rs. 35,000

The maximum subsidy amount per kW will not exceed Rs. 165,000, Rs. 150,000 and Rs. 135,000 in category "A", category "B" and category "C" VDCs respectively.

Improved Water Mill for Electrification

Subsidy category	Subsidy Amount		
	Category "A" VDCs	Category "B" VDCs	Category "C" VDCs
Subsidy (per household)	Rs. 8,000	Rs. 7,000	Rs. 6,000
Transportation subsity per kW	Rs. 20,000	Rs. 10,000	Rs. 5,000

But, the maximum subsidy amount per kW will not exceed Rs. 90,000, Rs. 80,000 and Rs. 70,000 in category "A", category "B" and category "C" VDCs respectively.

2. Solar Energy (Rural)

Solar System	Subsidy Amount		
	Category "A" VDCs	Category "B" VDCs	Category "C" VDCs
Small Solar Home System with 10 Watt Peak (per HH per system)	Rs. 5,000	Rs. 4,800	Rs. 4,500
20 Watt Peak - 50 Watt Peak Solar PV System per HH per system)	Rs. 7,000	Rs. 6,200	Rs. 6,000
> 50 Watt Peak Solar PV System (per HH per system)	Rs. 10,000	Rs. 9,000	Rs. 8,000
Institutional PV System forschool, health posts etc	Up to 75 % of the total system cost but not exceedingRs. 1000,000 per system		
Community managed PVpumping for drinking water	Up to 75 % of the total system cost but not exceedingRs. 1500,000 per system		
Household Solar Cooker	Up to 50% of the total cost but not exceeding Rs.10,000		
Solar Dryer	Up to 50% of the total cost but not exceeding Rs.15,000, Rs. 100,000 and Rs. 150,000 for domestic scale,medium scale commercial and large scale institutionalor commercial dryer respectively.		

3. Biogas

Domestic Biogas Plant

Region	Subsidy Amount			
	2 Cum	4 Cum	6 Cum	6 Cum
Mountain Districts as specified by GoN	Rs. 25,000	Rs. 30,000	Rs. 35,000	Rs. 40,000
Hill Districts as specified by GoN	Rs. 20,000	Rs. 25,000	Rs. 30,000	Rs. 35,000
Terai Districts as specified by GoN	Rs. 16,000	Rs. 20,000	Rs. 24,000	Rs. 25,000

Large Scale Biogas Plant

Biogas System	Subsidy Amount	
	Thermal Application per Cum	Electricity Generation per kW
Commercial Biogas Plants	Rs. 4,000	Rs. 65,000
Institutional Biogas Plants for Public Institutions	Rs. 11,500	Rs. 185,000
Community Biogas Plants with capacity more than 12 cubic meters	Rs. 9,000	Rs. 150,000
Municipal Scale Waste to Energy Systems	50% of the total cost but not exceeding Rs. 50,000 per cum.	50% of the total cost but not exceeding Rs. 250,000/kW, whichever is less.

4. Biomass

Type	Subsidy Amount
Household metallic improved cook stove for less than or two pot hole	Rs. 3,000 but not more than 50% of the stove cost
Household metallic improved cook stove for three pot hole	Rs. 4,000 but not more than 50% of the stove cost
Metallic improved cook stove installed inpublic institutions	Rs. 20,000 but not more than 50% of the stove cost
Metallic rocket stoves less than or twopot hole	Rs. 2,000 but not more than 50% of the stove cost
Metallic gasifier plant for thermal application for agro-processing	Rs. 150,000 but not more than 50% ofthe plant cost
Electricity is generated from the biomass energy sources	Rs. 200,000 per kilowatt installed capacityor 50% of the cost whichever is less

5. Wind

Capacity of Wind Turbine	Subsidy Category	Subsidy Amount in Rs.		
		Category "A" VDCs	Category "B" VDCs	Category "C" VDCs
<10 kW	Per household	Rs. 20,000	Rs. 18,000	Rs. 16,000
	Per kW	Rs. 150,000	Rs. 125,000	Rs. 100,000
10-100 kW	Per household	Rs. 20,000	Rs. 18,000	Rs. 15,000

Capacity of Wind Turbine	Subsidy Category	Subsidy Amount in Rs.		
		Category "A" VDCs	Category "B" VDCs	Category "C" VDCs
	Subsidy per kW	Rs. 1,75,000	Rs. 1,50,000	Rs. 1,25,000

But, the total subsidy per kW including household subsidy will not exceed 50% of the per kilowatt cost.

6. Productive Energy Use

For solated mini and micro hydropower based enterprises, a subsidy amount of 30% of the total investment cost for energy conversion and processing equipment, and/or hardware part of the enterprise/business but not exceeding Rs.100,000 will be provided for private enterprises, whereas that of 50% or Rs. 300,000, whichever is less, will be provided for community based enterprises.

For enterprises based on renewable energy other than mini and micro, including both thermal and electrical applications, a subsidy amount of 30% of the total investment cost for energy conversion and processing equipment, and/or hardware part of the enterprise/business but not exceeding Rs. 100,000 will be provided.

The additional subsidy of 10% but not exceeding Rs. 10,000 will be provided to developer/entrepreneur who are single woman, backward, disaster victim, poor and endangered ethnic group.

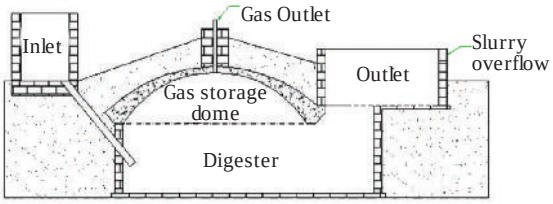
Biogas

Biogas is produced out of organic waste and can be used for thermal (heating) and electrical end-use. The slurry that is a by-product of the plant is used as organic fertilizer. Biogas has positive impact on household health, sanitation and plays a crucial role on sustainability of clean environment In Nepal. Biogas technology was introduced in 1955 and the Government has been engaged in biogas programme since 1975. More than 305,000 domestic biogas plants are installed in Nepal so far. 1992-2014 A.D. Biogas has been proven as an alternative solution for the growing energy crisis. Alternative Energy Promotion Center (AEPC) has been promoting various biogas technologies to mainstream renewable energy solution in Nepal to address poverty, gender and social inclusion and regional balance issues.

Milestones in Biogas

- Internationally recognised, replicated and efficient Public-Private Partnership established through learning from over three and half decade of experience. The model ensures that the public sector facilitates and coordinates the sector while the private sector ensures installation and after-sales service for biogas plants.
- A supportive policy environment (subsidies, low interest rates on loans, favorable fiscal policies and incorporation of quantified objectives).
- The supportive long term development partners commitment since 1992 avoiding “stop and go” effects.
- The organisation of the biogas companies in an association to regulate the sector through their own Code of Conduct. This association has members with over 100 prequalified companies and over 12,000 people employed directly or indirectly by the biogas companies.
- Provision of subsidies for making biogas systems affordable with additional subsidies for the poor and disadvantaged groups.
- Promoting credits for Biogas through local Financial Institutions.
- Proven monitoring and quality control mechanisms.
- National Geographical coverage in all 75 districts of Nepal.

Biogas Technology



2.5 m3 of biogas can replace 1kg of LPG

1.25TreesProtected per Year per Plant 7

7.4 Tons Greenhouse Gas Reduction per Year per Plant per Household

Biogas is produced by anaerobic digestion or fermentation or decomposition of organic wastes by the action of methanogenic bacteria. This energy allows biogas to be used as a fuel for any heating purpose, such as cooking. It can also be used in a gas engine to convert the energy in the gas into electricity. Biogas can be compressed, much like natural gas, and used to power motor vehicles.

Facts and Figures

No. of Household Biogas Plants	In Total: 3,05,147 Plants
	Mountain: 4,960
	Hill:1,47,114
	Terai: 1,53,073
	Rehabilitated Plants in2013: 28,070
No. of Community and Institutional Biogas Plants	Community: 18
	Institutional: 300. Additional new: 33.
Sahari Gharelu Biogas Plant– SGBP	23 Installed. Now at further experimentation.
Plants Registered in Clean Develop-ment Mechanism (CDM)	1,59,650 (Till 2014 A.D.)
Plants Registered in the Gold StandardCarbon Mechanism	7,500
Ongoing Activities	Waste to Energy
	New anaerobic digesters (eg.bag digester, Modified GGC2047 Model)- fiberglass reinforced plastic biogas plants
Major Focus	Increasing outreach in Low BiogasConstructed Districts

New challenges

Major issues on dissemination of biogas sighted as following:

- The domestic biogas success in terms of volume of installation has now warranted increased focus on growing replacement and rehabilitation to ensure functionality of installed plants.
- Using lessons of domestic biogas, a new market segment of biogas plants for larger communities and institutional biogas has emerged. Technical and management support to capitalise on this new emerging market remains a challenge.
- Technological shift/matching technology to ensure adoption of biogas in all geographical locations requires further streamlining.

NRREP Target

The target for 5 years (Mid July 2012-Mid July 2017) is as follows:

- In total, 130,000 Household Biogas Plants.
- 1200 Community, and Institutional, Commercial and Municipal Waste Based Biogas Plants.
- Introduction of large size biogas plants for commercial enterprises
- Commissioning of municipal scale waste to energy systems

International Partners

- SNV
- DANIDA l NORAD l GIZ
- DfID
- KfW
- World Bank
- ADB

Technical Service Providers

- BSP-N (Biogas Sector Partnership-Nepal)
- NBPA (Nepal Biogas Promotion Association)

Biomass

Introduction

Alternative Energy Promotion Center has been working on biomass energy sector with the objective of improving livelihood of rural populations through promotion of affordable, efficient and appropriate biomass energy technologies in Nepal and has been disseminating different types of improved cooking stoves (ICS) in all ecological zones of the country. This has significantly contributed towards reducing Indoor Air Pollution (IAP) thereby improving the health of women and children, reducing firewood consumption, reducing CO2 emission, contributing to environment preservation and decreasing the cooking, cleaning and firewood collection time thereby contributing to drudgery reduction.

AEPC aims to address issues related to policy formulation and implementation, lobbying for policy implementation through coordination mechanism among national institutions and programmes, and institutional capacity building of the sub-sector through awareness raising and human resources development. The strategies and approaches are aimed at developing policies and institutions, supporting energy provision improvements in the rural areas that eventually increase access to efficient and environment-friendly rural energy solutions, which address social justice and environmental sustainability.

Major Objectives

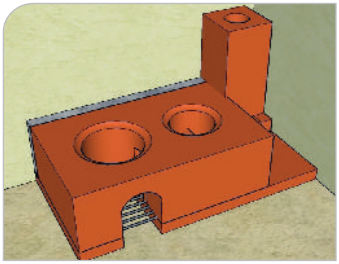
- Scaled-up implementation network for ICS in place and tested and certified stoves with defined quality criteria operational
- New technologies such as enterprise scale wood gasifiers and bio-briquetting ready and field tested for dissemination.

National Key Issues

Biomass is the primary source of fuel of the country. The total national energy consumption data also reveals that the fuel-wood has large share among any other energy sources resulting 77.7% of the total energy consumption (WECS, 2010). Majority of the country's population i.e., 83% (CBS 2011) lives in the rural areas and about two-third of the total households (about 3.47 million) in the country use firewood as usual source of fuel for cooking and additional 0.57 million households use dried cattle dung (Guitha). National ICS database shows the record of only around 0.95 million of these rural households using ICS for burning firewood. The huge number of remaining household are still estimated to use Traditional Cooking Stoves (TCS) of various types such as, three stone, tripod and non chimney mud stoves which are considered less efficient in combustion and thus consume more fuel wood, responsible for high level of indoor air pollution directly affecting the health of women and children who spend most of the time in kitchen. It is also considered to contribute in enhancing women's drudgery for collecting firewood, increase in deforestation and degradation of environment.

The AEPC, through implementing NRREP, intends to address this issue by disseminating clean and energy efficient solid biomass technologies for household and institutional cooking and heating purpose as well as finding solution for efficient thermal application in the small and medium scale enterprises where solid biomass is used as primary source of energy. Recent ambitious call by GoN "Clean Cooking Solutions for All by 2017 (CCS4ALL)" has given a high level of recognition to this issue at the GoN's policy and program level and hence has urged for the more dedicated efforts and increased resource allocation in this regard.

Key Achievements



- Around 935,824 mud ICS till 15 October 2014 throughout all ecological regions of the Country.
- 16,314 metallic improved cook stoves installed in high hill region of the country through private companies till 15 October 2014.
- More than 1500 Institutional/commercial ICS.
- 4 institutional gasifiers disseminated for drying agro-products.
- 75 Districts covered by mud ICS installation
- More than 9300 promoters/stove master trained for ICS building.
- Installation capacity in place for installation of 100,000+ ICS per year without subsidy.

Targets

- Dissemination of 4,75,000 Improved Cooking Stoves* including 35,000 Metallic cooking stoves over the five years period.
- Piloting of biomass gasifier for thermal application in the micro, small and medium scale enterprises.
- Piloting of biomass gasifier plants for community electrification and end use application.
- Enhancing scope of biomass densification technologies.

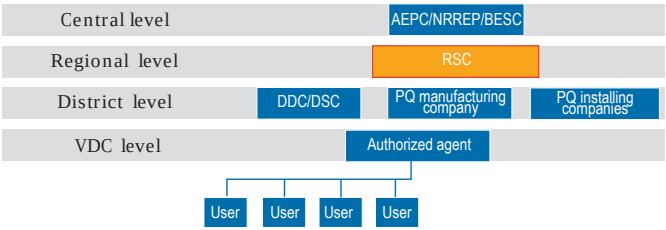
*target to be revised upward as per GoN call CCS4ALL

Key Partners

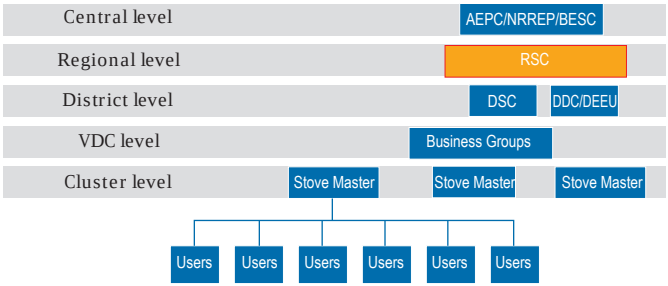
- 9 Regional Service Centers (RSC), 61 District Service Centers (DSC) operated by NGOs, Private Company and Cooperative are providing services to the biomass energy users.
- 32 pre-qualified metallic cook stoves manufacturing companies

Implementation Modality

Service Delivery Route and Actors (MICS: Subsidy Model)



Service Delivery Route and Actors (Demand Driven Model)



Climate and Carbon

Background

Despite having only 0.4 percent of the total global population and being responsible for only 0.025 percent of total GHG emissions in the world, Nepal will be affected disproportionately, especially from increasing atmospheric temperature. Nepal in average is experiencing maximum annual temperature increase of 0.06 °C. Further Nepal is identified as the fourth most vulnerable nation in terms of the adverse impacts of climate change. The role of renewable energy to address to climate change problem has been emphasized widely including in Nepal. Carbon and Climate Unit (CCU) was established in AEPC with the objective of contributing on climate change mitigation and as well as adaptation through the promotion of renewable energy technologies.

Major Climate Change Program under AEPC/ NRREP

AEPC through climate and carbon program provide technical support to MoSTE on climate change policy and strategy formulation, formation of climate change sensitive RE policy and plans; support District Development Committee to develop and implement climate and gender sensitive energy plans. Under NRREP climate change programs are focused on updating knowledge on Climate change mitigation and adaptation options; further development a well diversified portfolio of RETs projects using different instruments and establishing a high quality performance assurance and monitoring systems. Establishing link/relationship between climate change and renewable energy resources is ongoing. Monitoring and verification of registered clean development mechanism programs/projects is a regular and crucial activity to realize expected revenue from the carbon projects. MoSTE has designated AEPC as implementing agency to formulate Low Carbon Economic Development Strategy (LCEDS) for Nepal. Further AEPC has actively engaged to widen its networking in climate change issues in global, national and local level.

Key Achievements

AEPC has developed the District Climate and Energy Plans (DCEP) preparation Guidelines and supported DDCs to formulate District Climate and Energy Plans

(DCEPs) in three pilot districts: Ilam, Makawanpur and Mustang. It is also envisaged to prepare and implement DCEP in all remaining districts in current three years periodic plan.

AEPC is working on development & management of RETs carbon projects feasible in the country. The key achievement of CCU till date is summarized below:

- Developed District Climate and Energy Plan Preparation Guidelines
- Supported DDCs in preparation and implementation of District Climate and Energy Plan (DCEP) in three district: Ilam, Makwanpur & Mustang.
- Envisioned the preparation and implementation of DCEPs in GoN's current 3 years periodic plan.
- DCEP Preparation in 25 districts ongoing.
- 5 Clean Development Mechanism Projects got registered (4 Biogas projects and One Micro-Hydro Projects)
- One Biogas Programme of Activity (PoA) is also registered and additional 4 CDM Project Activities (CPAs) are also included. This is in the process of Gold Standerdization as well.
- Improved Water Mill & Improved Cooking Stoves Program of Activities in advance stage of registration.
- Low Carbon Economic Development Strategy for Nepal drafted and in final stage for approval from Government.
- Till now, 0.72 Certified Emission Reductions (CERs) issued from registered CDM Projects generating the revenue of about 4.5 million USD.
- Certified Emission Reduction Purchase Agreement (CERPA) signed for Improved Water Mills (IWM) PoA to sell 75000 CERs.
- Negotiation ongoing for selling about 0.38 Million CERs that will be generated from Improved Cooking Stoves (ICS) PoA.

Renewable Energy and Climate Change: Mitigation and Adaptation Benefits (Figure 1)

Renewable energies by definition are non-fossil fuel energy sources that have no permanent greenhouse gas (GHG) emissions. RE offers a constructive direction to reduce climate change effects that provides simultaneous adaptation and mitigation benefits. Use of RE directly reduced, off-set and avoid GHG emissions from fossil fuel used for lighting, cooking, agro-processing, water-pumping, transport and other fossil fuel intensive work as well as it reduces the de-forestation. The renewable energies provide facilities to the community which directly or indirectly helps people to raise their adaptive capacity through awareness, income, improve their health, use of clean energy for irrigation in agriculture production and post-harvesting processing. Ultimately these increase the adaptive capacity of people against climate change.

Reduce kerosene consumption for lighting

Reduce de-forestation by firewood saving

Reduce diesel/petrol use in agro-processing

Reduce diesel/petrol consumption of vehicle

Mitigation

Adaptation

Income Generation Activities

Awareness Raising

Safe Drinking Water Pumping

Irrigation water pumping-Agriculture Production

Reduced Air-pollution-Reduced health risk

Solar Energy

Solar energy is the power derived from the sun. Radiant light and heat from the sun can be harnessed by different solar technologies. If solar energy is converted into electricity by using solar cells or panels, it is called Solar PV applications and if solar energy is converted into heat rather than light, it is called solar thermal applications.

AEPC, through its solar energy unit, support dissemination of solar energy systems through national coordination of solar sector activities. AEPC has been the largely successful towards meeting its objectives of promiting Solar Home System (SHS) with emphasis on quality and availability of credit as a mean for rural electrification which has proven to be only feasible way to provide electricity in many rural areas of Nepal. In addition, it also promotes Small Solar Home System (SSHS) (Solar Tuki,) as an immediate and intermediate way to provide electricity specifically for the poorer rural population. It also supports solar powered drinking water projects, institutional solar power systems, solar cookers and solar dryers. In addition, the sub-component also plans to support for the management of used lead acid battery (ULAB) in Nepal.

Key Achievement so far

Since the establishment of AEPC, these are the numbers of different solar systems installed in Nepal under the support from various programs and projects under AEPC.

SN	System	Number	Installed Capacity (as of July 2014)
1	Solar Home System (SHS)	470,812	11.25MW
2	Small Solar Home System (SHS)	42,019	0.27 MW
3	Institutional and Pumping System (ISPS & PVPS)	1195	1.31 MW
4	Solar Dryer and Cooker	2,225	

Major Challenges

- With increasing adoption of solar PV systems, there is a need to establish environmentally responsible recycling of lead-acid batteries at the end of their life.
- With rapid global advancement in technology, there is a constant need to ensure adoption of proven technologies in Nepal.

Targets and Key Focus

AEPC targets to achieve the following target by July 2017, through National Rural Renewable Energy programme

- Support for installation of 600,000 Solar Home Systems and Small Solar Home Systems.
- Support for installation of 1,550 Institutional Solar PV systems
- Support for installation of 7500 solar dryers and cookers
- Support for the management of used lead acid battery by establishment of battery recycling plant and battery collection canters.
- Improved Quality Assurance of the systems.
- Increased Cooperation for Complementarities and Synergies

Key Activities

AEPC works towards building commercially viable and sustainable solar sector in Nepal that can deliver the technology to the needy population with good quality and reasonable price.

The following are the main component activities:

- Capacity building of partner organisations, including training, skill testing, etc.
- Promotion of the PV technology among the rural population out of access to electricity.
- Market priming by providing subsidy to the end users of the solar PV systems.
- Preparation and updating of the required technical standards and delivery modalities for sustainable dissemination of solar technologies.
- Development of Fraud Proof subsidy processing and registration systems
- Establishment of an effective monitoring mechanism to avoid possible abuse of the subsidy facility or to avoid any other unscrupulous activities e.g. use of substandard components, etc.
- Establishment of an appropriate battery recycle mechanism to avoid possible environmental hazards.

- Piloting large scale solar systems in Nepal.
- Exposure visits for experience and knowledge sharing
- Establishment of Solar Energy MIS and Database (SEMD) system and online subsidy application form processing.
- Preparation of training manuals.
- Conducting various surveys and other studies required.

Implementation Modality

AEPC mainly works in public private partnership modality approach for the installation and after sale service of solar systems. AEPC qualifies the companies /vendor for solar system installation and these are the numbers of Pre-Qualified (PQ) companies for the installation of different solar systems.

No. of PQ Companies

SN	Solar Systems	No. of PQ Companies
1	SSHS/SHS	69
2	Institutional Solar Power System including solar pumping	2
3	SSHS/SHS & Institutional Solar Power System including solar pumping	42
4	Solar Thermal System	6

Key Stakeholerds

SN	Organization	Remarks
1	Renewable Energy Test Station (RETS)	Works for the quality assur-ance of the solar products
2	Solar Electric Manufacturers Associa-tion (SEMAN)	Association of Solar PV Companies
3	Association of Solar Thermal EnergyDevelopment Nepal (ASTED)	Association of Solar Thermal Companies
4	Nepal Association of Solar ThermalEnergy (NASTE)	

Community Electrification (CE)

Introduction

Community Electrificaiton works on the electrification of community by Mini, Micro and Pico hydro schemes. As per the classificaiton schemes that generate electric power from 100 kW to 1000 kW (1 MW) capacity named are Mini Hydro. AEPC also works on supporting Pico-hydro (below 10 kW) and other projects more than 10kW, but less than 100 kW are micro hydro at present.

The Community Electrification Sub-Component within National Rural Renewable & Energy Programme aims at stepping up the rate of implementation, increasing the average size of micro hydro power schemes, and improving the sustainability and financial viability of small and mini hydropower schemes by taking a business approach. The support is primarily geared to overcome technical, financing, institutional and managerial challenges, which constitute the most serious obstacles in scaling up community electrification.

Major Issues

Community electrification schemes are too small to provide meaningful capacity for productive energy end-use. At the same time, it has in general not been possible to utilise the small capacity available in a profitable manner that would make a difference to the scheme's sustainability. Load factors are low, and this generates far less income from electricity sales than is necessary to achieve sustainable operation and maintenance.

Target

As agreed in by major development partners in NRREP: CESC the goverment's national framework, through its four specific outputs has a target of installing 25 MW through mini/micro hydropower. This is expected to electrify additional 150,000 rural households and 4,000 Improved Water Mills.

Progress to Date

AEPC through its programs have facilitated in producing 22.15 MW and electrifying 224,007 numbers of households.. Micro hydro has facilitated in electrifying 3% or rural households in Nepal.

Past Programs	Achievement
AEPC/REDP/RERL	7.5 MW electrifying 75,401 households
AEPC/ESAP	8.5MW electrifying 85,246 households
	IWM-7,527 (SS-6,594,LS-933) IWM/E-23 electrifying 871 households
AEPC/NRREP	6.15 MW electrifying 63,360 households IWM-1,751 (SS-1,642, LS-109)

Micro Hydro Project Cycle

AEPC and its stakeholders backstop the developer communities through all the eight stages required to develop a mini hydro. Finally, the community is responsible for its management and operation thereon.

STEP 1	Request/Demand collection
STEP 2	Preliminary Study
STEP 3	Detailed Feasibility Study
STEP 4	Assessment and approval of DFS from Technical Review committee.
STEP 5	Subsidy Approval
STEP 6	Construction and commissioning
STEP 7	Project completion, power output verification and quality check
STEP 8	One year guarantee check

Major Stakeholders

In each of the steps as shown in table above different categories of stakeholders are involved.

District Development Committees (DDCs) through dedicated units for Renewable Energy

There are units under each DDC that look after renewable energy based business of the district. DDCs are responsible for planning as well as implementation of Pico- hydro systems in their district. These units provide technical, social and management backstopping to projects that are under various stages of construction.

Regional Service Centers (RSCs)

Regional service centers are local NGOs that act as a bridge between AEPC and local micro hydro developers. They are located at several locations in Nepal and cover 54 districts with micro hydro potential.

RSCs are primarily responsible for following tasks.

- Information dissemination, awareness creation and counseling.
- Assistance in site identification through carpet survey, inventory preparation and demand creation.
- Local planning exercise at VDC/ DDC level.
- Facilitation between mini-grid developers, consultants and manufacturers.
- Community mobilisation and assistance to community entrepreneurs in realising micro hydro projects.

Private Sector

The private sector is key implementing partner for micro hydro installations. They are involved in all steps of the project cycle. Each year AEPC prequalifies companies for conducting detailed feasibility study and installation. Due to increased demand for micro hydro, such prequalified companies have also grown over the years. In 2002 there were only 21 installation companies and 29 survey firms which had more than double by 2012.

Year	Number of installation Firms	Number of surveying Firms
2002	21	29
2004	20	34
2005	27	27
2007	37	45
2012	57	52
2013	78	61

Institutional Development

Institutional Development Sub Component (IDSC) is strategically placed within NRREP to work towards ensuring the sustainable growth of overall renewable energy sector in Nepal. It is responsible for the sound and efficient use of NRREP resources towards meeting the five years NRREP targets and objective and also instrumental in institutional strengthening of AEPC, related government agencies, private sectors and civil society organizations.

Major Areas of Work

IDSC's priority areas of fall under the below mentioned broad heading and interrelated themes

Operation Planning

IDSC takes care of the entire budget and planning cycle of NRREP and provides both the preliminary and final budget ceiling to all components and units of NRREP. It receives the final detail work plans and budgets from all the components and sub components for review to ensure that they comply with the overall budget plan. IDSC further investigates for any significant deviations or changes in the work plans and follows up with the respective components/units for timely adjustments to maintain the budgetary disciplines.

Strategic Planning and Improving Renewable Energy Policy Responses

The IDSC oversees the overall renewable energy sector development. There are needs to improve both access and quality of energy services to both the rural and urban households in Nepal. Alongside, there are also challenges to identify resources streams and need to address government and development partners' priorities. Considering the fact that the prevailing circumstances and the decision AEPC takes today will have its impact on the future growth of RE sector in Nepal, IDSC highly priorities planning process based on strategic thinking. It engages in achieving the AEPC's vision and designing strategies that allow the institution to take advantage of existing opportunities arising from the national and international RE policy debates, discourses and priorities and to adjust to the changing circumstances.

Institutional Strengthening and Human Resource Development

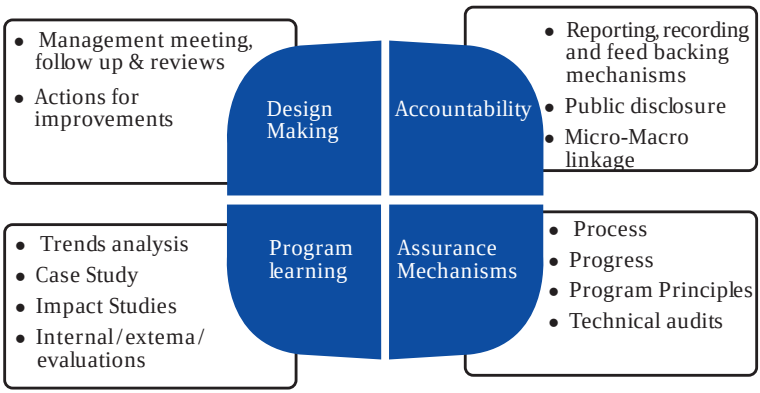
Institutional Strengthening is a qualitative endeavor IDSC prioritizes in all the level of AEPC starting from promotion, expansion, development of RE products and service delivery. It also closely works with other government agencies, development partners and other national and international stakeholders for the RE sector growth.

Alongside, IDSC believes in the full engagement of NRREP work force to achieve its targets and mandates. It manages to identify the capacity gaps within NRREP workforce and alongside trains and motivates them by identifying ways to excel and enhance their skills and knowledge base to maintain and ensure the wide range of skills and excellence within AEPC.

Monitoring and Quality Assurance

Introduction

The AEPC/NRREP has set up the Monitoring and Quality Assurance (MQA) Unit within the Technical Support Component. The MQA Unit involves in setting up result-based M & E system which has been viewed as a vital management tool in the AEPC/NRREP. The NRREP program document anticipates that the NRREP's



monitoring and reporting system oughhttp://www.aepc.gov.np/library/tinymce/ uploaded/Capture.JPGt to be aligned with the guidelines of National Planning Commission and Ministry of Finance. One of the major tasks of the unit is to make regular assessments of progress against the set results and annual plans. It will also cover the monitoring of energy related climate change as well as socio-economic impacts including Gender and Social Inclusion (GESI).

The MQA unit has been setting up necessary M&E systems and tools such as Baseline, MIS, verification, reporting, review & Feedback, progress tracking etc toward instituting result based M&E system. The results based M&E system will therefore designed for detailing the operation of the feedback mechanism including how it

provides management information to the different levels of NRREP management. AEPC/NRREP also envisages developing an integrated web-based MIS as another vital instrument so that everyone interested will have easy access to the required information.

Result area

The AEPC/NRREP has already framed result area for Monitoring and quality assurance as 'develop and implement AEPC monitoring system for result -based management'. The MQA unit is primarily responsible to achieve this result within the program period.

Key Guiding Principles

- Adopt the Result Based Management/ Monitoring system in NRREP
- Follow government reporting flows and formats
- Build on existing M&E systems
- Capacitate program staff on MQA

Operational Strategy

Monitoring and Quality Assurance unit has take on following Operational Strategies as vehicle toward achieving its results:

- Develop and establish proper information flow mechanism at all level.
- Develop and establish integrated M&E system in NRREP such as integrated PMIS, program baseline, verification mechanisms, reporting mechanism towards strengthening Result based management.
- Maintain close coordination between MQA unit and all components/sub components regarding monitoring and evaluation matters.
- Build network with other organizations for possible collaboration on Monitoring and Evaluation.

Gender Equality and Social Inclusion

GESI Mainstreaming in AEPC/NRREP

The AEPC/NRREP is strongly focused on poverty reduction by effectively reaching out to the more remote and poorest part of the country. Aiming to contribute economic growth, reflecting to three year periodic plan (TYP) (2012/13-2014/15), Gender Equality and Social Inclusion (GESI) approach is mainstreamed into the NRREP at all levels by including in the development objective, immediate objectives, in relevant outputs and activities, in indicators and targets as well as in monitoring.

Energy demand is unmet; distribution is unequal as poor, women and DAG have less access to energy technologies due to incapable affordability. NRREP is designed to overcome the existing problem and ensure energy access to remote and rural population by adopting the positive discrimination and affirmative actions to address to need of deprived, marginalized and disadvantaged groups of the Alternate and Renewable Energy Technologies and it services.

GESI approach challenges on existing chaos in power relationships, structures and institutions by seeking social, political and economic transformation from the household, community, market up to the state level. It assesses the key issues hindering access and articulation of women, poor and socially excluded group in the participation and benefit sharing and then devises strategy to address these issues to create space for new realities and relationships, so that girls, boys, women and men of any age, class, caste, ethnicity, religious identity or different ability are enabled to live with dignity, justice and respect, asserting their rights and responsibilities. Therefore GESI is widely applied for equal access and control on development inputs and its benefits provided by the nation or development projects.

GESI goal of NRREP

Recognize AEPC as efficient, effective and GESI responsive institution in promotion of RET by improving the living standard of rural women and men by creating RET based employment opportunities and generate income through MSME (medium, small and micro enterprises).

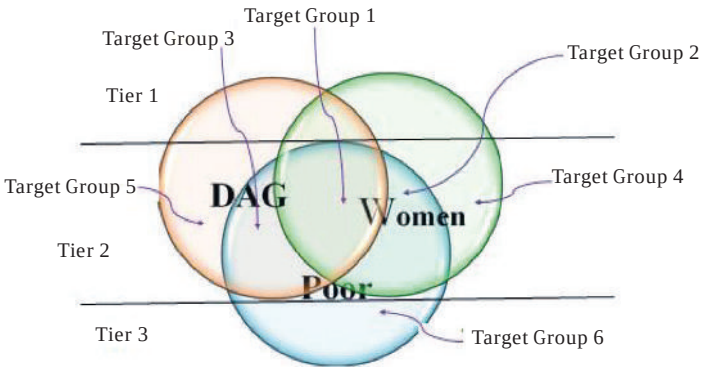
Areas of Intervention

GESI is considered as cross cutting at all levels. Hence, the approach is intervening at 3 levels; policy, service providers/ duty bearers and beneficiaries.

a. Policy level
- Integrate GESI concerns and issues in the policies, strategies, rules and regulation as well as guidelines.
- Generate awareness and enhance capacity of the policy level and decision makers
- Advocate/ lobby and influence to address GESI issues.

b. Service providers/ Duty bearers
- Advocate/ lobby and influence to incorporate GESI in their programme
- Enhance capacity of service providers/ duty bearers to discharge services in a GESI responsive ways.
- Prepare beneficiaries level database with sex and caste disaggregation.

c. Beneficiaries
- Generate awareness among the communities on RET and its benefits
- Empower them to increase their claim making capacity and raise demand for RETs



Priority of targeted beneficiaries

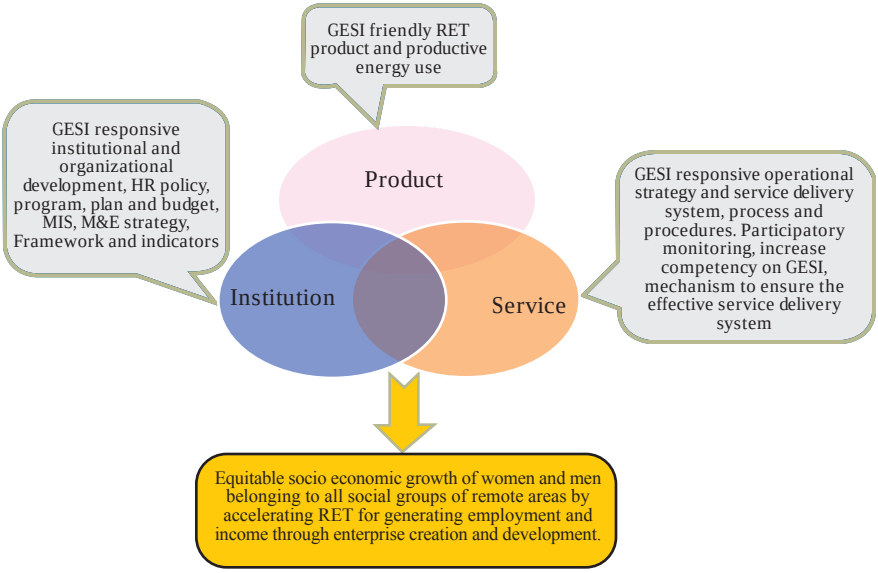
Beneficiaries are 3 tiers based on economic and social status such as tier 1 is the poor segment of the society, tier 2 is the middle level and tier 3 is the higher level. With considering the programme approach of demand based and high upfront cost of technology, the programme will first focus on the 2nd tier, then 1st tier and lastly tier 3 with affirmative action and positive discrimination. The program is focused on the target group 1 with highest priority, then 2, 3, 4, 5 and 6 respectively as shown in picture below:

GESI Mainstreaming approach

- Affirmative action and positive discrimination to the targeted groups
- Subsidy and credit facilities for the targeted groups
- Social mobilization with reflect methodology to assess needs of targeted groups and enabling their demand dynamics
- Frequent critical analysis on demand and supply of the target groups
- Work with likeminded and right holders organizations
- Coordinate and collaborate with local bodies, line agencies, social leaders and media
- GESI capacity building of the stakeholders and partners at all levels
- Create platform for GESI responsive RET knowledge building, sharing and learning
- Piloting action research adopting right based approach to reach poor women and men, and women belonging to janjati, dalit, madhesi, muslim and other backward communities (OBCs).
- Revising and devising from the lessons learned and up-scaling of the good practices.

GESI Operational Framework

The GESI mainstreaming plan is intended to work in 3 broader areas such as product, service and institution, in a way that all the RET services delivered to the targeted people as their needs and demand in a responsive way.



Major achievements till date

- Publication: GESI toolbox, audit guideline, SM guideline, mainstreaming plan, CNA, Citizen's charter, Code of conduct, Training manuals for DDC/VDC and social mobilisers
- GESI gap analysis on the institution and programme of AEPC/NRREP
- Capacity building on GESI to the staffs at all level
- Establishment of disaggregated database system on RET beneficiaries
- Establishment of GESI responsive planning and budgeting
- Practice on Sex and caste disaggregated beneficiaries reporting mechanism
- Affirmative action in subsidy policy and delivery mechanism for poor and excluded groups

Local body Coordination and Outreach Management

Drawing from the lessons of the first year of implementing NRREP, a need to strengthen the focus on outreach to aid expansion of renewable energy technologies has been realized by the programme. In order to reinforce this focus, a dedicated sub-component for managing the outreach (through DDC and RSC in particular) has been established on September 2013 by the Programme Steering Committee, the apex body for decision-making in NRREP and named it Local Body Coordination and Outreach Management Sub-Component (in short Outreach).

The major responsibility of Outreach SC is to establish and strengthen institutional set up of DEECCS (previously DEEU/S) and RSCs by enhancement of their capabilities, collaborate with local governance bodies (DDC, VDC and municipalities) and other related stakeholders to make use of their existing institutional mechanism and program to enhance the livelihood of the rural and remote people though intervention of renewable energy services. In this context, ownership, harmonization, synergy, result for monitoring and alignment are most crucial elements of the coordination and make the clarity on roles and responsibility of all stakeholders.

Specific objective of Outreach is management of output 2.15 and 2.16 of NRREP.

- Output 2.15: DEESs become an integral part of DDCs and work to establish linkages between the AEPC and the needs of the rural population whilst promoting the interests of women and marginalised groups.
- Output 2.16: RSCs are contracted and their capacity enhanced to facilitate the delivery of RE services and promote linkages at a local level as a resource of the AEPC.

Strategies adopted by the Outreach SC are:

- Decentralize RET services through MoFALD, DDC, municipality and VDC
- Institutionalize, strengthen and operationalize RSCs and DEECC section/DDC.
- Collaboration and coordination with RSCs, DEECCS/DDC and Private sectors to extend RET services

- Promotion of result based/ GESI responsive planning and budgeting
- Capacity Building of RSC and DEECCS to manage the RET services delivery effectively
- Facilitate to promote RET services through different means and mode
- Play catalytic role between internal (Components and technical sub-components) and external outreach actors, only for non technical issues.

Major Achievements till the date:

- Signed Memorandum of Understanding (MoU) with all District Development Committee (DDC) for RET related programs implementation.
- Supported to endorse Environment Friendly Local Governance Framework, 2070 and establishment of DEECCS under DDC structure.
- Prepared Guideline for DEECCS, 2013 for its operationalisation. DEECCS is functioning smoothly to implement RET through the DDC.
- Outreach SC has been facilitating on Annual planning process of both RSC & DEECCS. Further it has been supporting to disburse budgets by compiling AWP. It has also supporting for RSC and DEECCS report (trimester and annual) compilation and facilitate for Random Sample Monitoring (RSM) through DEECCS.
- Outreach SC has been facilitating the management, administration and financial part of all RSCs and DEECCS in a coordinated ways that other components and technical subcomponents has able to be concentrated their work explicitly in technical aspects to deliver the services through RSCs and DEECCS. The efforts have shown the remarkable physical progress in Mini/micro hydro, 2013/14.
- With the collaborative efforts of outreach SC; DDCs has declared many VDCs as indoor Air Pollution (IAP) free in support to Government of Nepal campaign 'Clean Cooking and Lighting solution for all by 2017'.
- With coordination of RSCs and DEECCs, some of the VDCs have declared as the model village of RETs such as biogas village (Bharatpokhari VDC of Kaski district) and Clean energy village (Gogane VDC of Makawanpur).
- With the continuous advocacy, lobby and follow up of Outreach SC, Renewable Energy issues (7 tables) are incorporated in MoFALD, Local Bodies Planning Guideline, 2071.
- Outreach SC has initiated to establish functional linkage between RSCs, DDCs and other stakeholders.
- Facilitated to comply all RSC to prepare and follow administration and finance guideline, anti corruption policies, HRM guideline.

Existing Outreach Structure

Currently Outreach is coordinating with all 75 DDCs and 9 RSCs to expand RET services. The Overview of current Outreach structure is as follows:

Overview of Outreach Structures				
Regional Service Centres		RSC working districts	District Development Committees	
Name of RSCs	Email		DDC Phone	DDC Fax
Sagarmatha Community development Centre (SCDC), Saptari	scdcbrt@yahoo.com	Jhapa	023-455084	023-456394
		Morang	021-522707	021-523379
		Sunsari	025-560155	025-560155
		Udayapur	035-420143	035-420144
		Saptari	031-520196	031-520196
		Siraha	033-520116	033-520071
		Khotang	036-420120	036-420120
		Dhanusa	041-523354	041-
Renewable Energy Water Sup- ply and Sanitation Promotion Centre (REWSSPC), Rautahat	rewsspc@yahoo.com	Sidndhuli	047-520149	047-520544
		Mahottari	044-520042	044-520237
		Sarlahi	046-520853	046-520853
		Bara	053-550108	053-550130
		Parsa	051-523218	051-521599
		Routahat	055-520144	055-521362
Resource Management and Rural Empowerment centre (REMREC), Kavre	remrec@ntc.net.np, remreckatari@gmail.com	Okhaldhunga	037-520143	037-520143
		Solukhumbu	038-520241	038-520241
		Ramechhap	048-540144	048-540029
		Dolakha	049-421261	049-421142
		Kathmandu	01-4472509	01-4494329
		Lalitpur	01-5523410	01-5555115
		Bhaktapur	01-6614826	01-5555115
		Kavrepalanchwok	011-490246	011-490146
		Sindhupalchwok	011-620102	011-620087
Rural Empowerment Society, RESDTN, Tanahun	restanahun@wlink. com.np	Makawanpur	057-523010	057-521673
		Chitwan	056-520147	056-522557
		Nuwakot	010-561220	010-560859
		Dhading	010-520165	010-520165
		Rasuwa	010-540142	010-540143
		Tanahu	065-560174	065-560637
		Gorkha	064-420238	064-420377
		Lamjung	066-520143	066-520281
		Manag	019-440244	019-442014
		Nawalparasi	078-520247	078-520673

Overview of Outreach Structures				
Regional Service Centres		RSC working districts	District Development Committees	
Name of RSCs	Email		DDC Phone	DDC Fax
Dhaulagiri Community Resource Development Centre (DCRDC), Baglung	dcrdc@ntc.net.np	Mustang	069-44143	069-440044
		Kaski	061-521562	061-529546
		Parbat	067-420154	067-420154
		Syanja	063-420458	063-420458
		Palpa	075-520121	075-520292
		Gulmi	079-520229	079-520229
		Myagdi	069-520530	069-520530
		Baglung	068-520148	068-520190
		Kapilbastu	076-560005	076-560307
		Rupandehi	071-521423	071-522984
Backward Society Education (BASE-Nepal), Dang	info@nepalbase.org	Rukum	088-649091	088-649091
		Salyan	088-520072	88520023
		Rolpa	086-449114	086-449114
		Pyuthan	086-420046	086-420046
		Dang	082-560144	082-560144
		Dolpa	087-550039	087-550128
		Arghakhanchi	077-420229	077-420202
Association for Social Trans- formation and Humanitrarian Assistance (ASTHA) Nepal	info@astha-nepal. com	Humla	087-680018	087-460023
		Mugu	087-450117	087-460023
		Jumla	087-520114	087-520114
		Jajarkot	089-430100	089-430100
		Bankey	081-520196	081-520196
		Kalikot	087-440114	087-440121
		Dailekh	089-420114	089-420165
		Surkhet	083-521368	083-521082
		Bardia	084-420139	084-420040
Rural Development Service Centre (RDSC), Doti	rdscdoti@ntc.net.np	Dadeldhura	096-420144	096-420448
		Baitadi	095-520144	095-520062
		Darchula	096-420144	096-420026
		Doti	094-420156	094-420577
		Bajhang	092-461506	092-421144
		Bajura	097-541024	097-540314
		Achham	097-520144	097-520144
		Kailali	091-521607	91521910
		Kanchanpur	099-523778	099-521148

Business Development for Renewable Energy and Productive Energy Use Component (PEUC)

Introduction

Experience has shown that community electrification in rural areas does not automatically induce local economic development. This is primarily due to lack of local business and entrepreneurship development support services; weak orientation on enterprise creation; poor knowledge and lack of information to establish linkage with markets, value addition; and fragmented capacity of existing small entrepreneurship to capitalize on available energy as a factor of production. RETs, therefore, have limited impact on productivity, income and employment generation among beneficiaries of RE catchment areas.

Business Development for Renewable Energy and Productive Energy Use Component (PEUC) is one of the three components of NRREP. This component seeks to promote productive energy use of Renewable Energy(RE) in order to generate employment and income of the rural women and men by establishing Micro, Small and Medium-sized Enterprises (MSMEs) and engaging households (HHs) in Income Generating Activities (IGA).

The immediate objective of PEUC is: "To contribute to an increase in income generation and employment potential for MSMEs in rural areas, particularly for women and men belonging to socially and economically disadvantaged groups."

Outputs of PEU Component

(i) to enhance capacities of existing MSMEs,

(ii) to create new and innovative MSMEs,

(iii) to make appropriate Business Development Services (BDS) available to MSMEs in RE catchments areas, and

(iv) to develop and implement Income Generating Activities (IGA) for households (HHs) in RE catchment areas

The following are the targets defined for PEUC's implementation:

- 2,800 existing MSMEs upgraded
- 1,300 new MSMEs established

- Employment increased by 19,000
- 15,300 HHs supported through IGA

Working Area and Scope

The working area is divided into two groups for PEUC's activities at various locations as under.

Working Area for Productive Energy Use Promotion

Group	Area Characteristics
A	Locations where micro and mini hydro plants developed by AEPC are in operation
B	Mini and micro hydro plants developed under NRREP. The PEUC will work closely with the Technical Support component from the initial stage of the RE scheme.
C	RE schemes other than hydro power plants developed or to be developed under NRREP and showing potential for MSME such as large biomass/biogas schemes and institutional Photovoltaic solar systems.

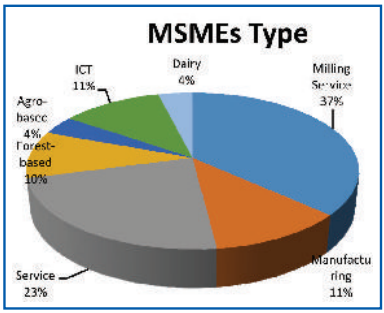
PEUC scopes can further be elaborated as below;

Areas of Intervention

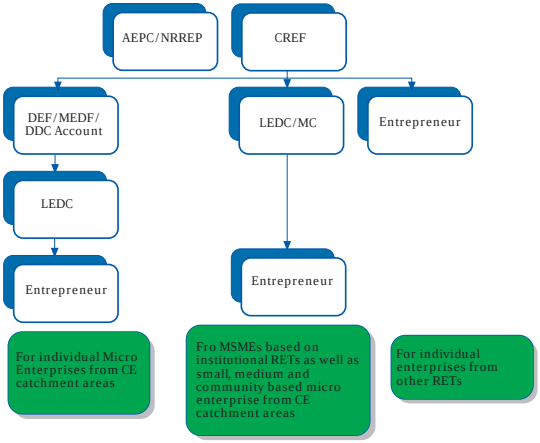
S.N.	Areas of Intervention	Featured Activities
1.	MSMEs promotion in regular basis	• Selecting operational and under-construction Community based Electrification (CE) projects with potential MSMEs demonstrating substantial market demand and growth potential • Conducting business opportunities assessment for establishing or upgrading MSMEs in the selected CE projects • Identifying product/services based on local resources and capacities, be powered (at least partially) with RE and lead to income and employment generation within CE catchment area • Collecting spontaneous demands from entrepreneurs
2.	New and Innovative	• Encouraging to bring outside investors in RE catchment areas based on comparative advantage • Analysing value chain of the selected products originating from RE catchment areas and promoting use of energy at various stages of the chain for value addition • Conducting pilot projects in selected locations, evaluating results and lessons learned • Replicating and up-scaling good practices
3.	Renewable Energy Technologies (RETs) for Enterprise	• Collecting demand from entrepreneurs to install RETs for establishing/upgrading of the enterprises/businesses· Carrying out rapid assessment of the enterprises as demanded by entrepreneurs • Coordinating with Technical Support Component for Detail Feasibility Studies (DFS) to establish RET for operation of enterprise/business

Progress to Date

Under NRREP, as of FY 2070/71, Business Proposal Review Committee and District Level Project Review committee have reviewed and recommended 387 MSMEs for subsidy. Out of these MSMEs 306 has already received subsidy. It is expected that these MSMEs will provide employment opportunities to 753 people.



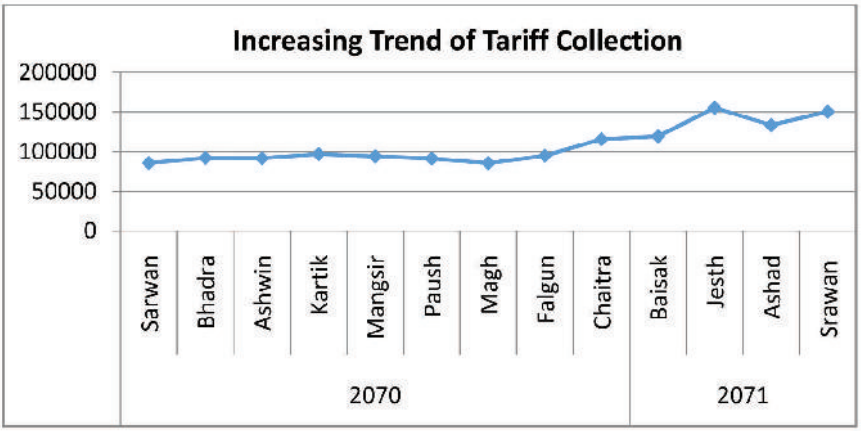
Fund flow Mechanism



PEU Promotion in Khamari Khola MHP Catchment Area

Khamari Khola MHP situated at Babiyachaur VDC, can be reached in three-hour drive from Birendranagar, Surkhet. The MHP has an installed capacity of 53 kW. Khamari Khola MHP has proven itself as a viable solution for providing reliable energy, thereby, providing positive economic impact on low income populations of Babiyachaur. Contribution of AEPC is visible in promoting productive use of available energy in the MHP catchment area. Eighteen micro and small enterprises have been established in the MHP catchment area through technical and financial support from Productive Energy Use Component of NRREP/AEPC. These enterprises are providing employment opportunity for 50 local people (28 full time and 22 part time). In addition to these enterprises, 25 households are involved in various income generating activities (IGAs) creating self-employment opportunities for themselves. These enterprises and IGAs have mobilized investment of more than NRs 8.6 million out of which around 25% was supported from AEPC.

Operation of these enterprises has contributed towards sustainability of the MHP via increasing the revenue through maximum use of the electricity generated in productive sectors. Tariff collection of the MHP has been significantly increased after the establishment of those enterprises. The tariff has been increased by 75% in Srawan 2071 compared to previous year. The following figure shows the increasing trend of the tariff collection for the year of 2070/71 in Khamari Khola MHP.



Wind Energy

Wind energy generation is the process by which the wind is used to generate mechanical power or electricity. If the mechanical energy is used directly by machinery such as pumping water or grinding grains the machine is usually called wind mill. If the mechanical energy is then converted into electricity the machine is called wind generator.

Riso WInd Power Density Potential Base Resource Map
(at Above 50m Average Ground Level)

AEPC, as an apex institution for the promotion of renewable energy in Nepal, has been continuously working on Renewable Energy (RE) sector through its annual programs and projects. Wind Energy is one of the alternative sources of energy which could be instrumental in developing sustainable energy mix in the country. However, the situation of wind energy development is still in infant stage due to years of underinvestment but the commitment and the interest of the government, for promoting wind energy in Nepal, are at higher priority level in recent years. The Solar and Wind Energy Resource Assessment (SWERA) conducted by the AEPC with support of UNEP/GEF in 2008, reported significant potential of wind energy resources in selected parts of Nepal. According to the report, around 3000 MW of power could be generated even if 10% of total potential area of wind power is considered.

The SWERA report unlocks the potential of wind resource in Nepal in broader level. On the basis of this report, many specific and detail site measurement activities are being carried out with initiation and support from the AEPC with an active involvement of the private sector. Since its major intervention in this sector was in 1989 with installed capacity of 20 kW, the country had to wait 2

decades to see another kilo watt sized wind turbines in Nepal. During that period, the focus has been on promotion of small scale micro wind turbines, especially for off grid rural electrification. All effort done till 2010 sums to 13 kW of wind power promoted with the support from AEPC and ITDG/PAN.

Apart from SWERA project, AEPC has been monitoring continuously wind data from the potential sites of the country. Thini and Kagbeni sites of Mustang district have shown good wind potential and these sites could be developed for wind farming, as there is possibility of feeding the generated power into the national grid.

Nevertheless, the recent days have witness lots of interest from government as well as academic institution, private sectors and few development partners. The wind energy subsidy policy had been revised in 2013 and corresponding delivery mechanism was developed for the implementation of subsidy policy. According to the subsidy policy, still it is focused on off-grid small wind project promotion (< 100 kW) with direct household based subsidy support through the pre-qualified private sector. Beside that wind energy policy has already been drafted by the AEPC which will be a part of overall RE policy of the GoN, and is waiting for final approval from the government. Due to improved engagement of various stakeholders in this sector, lots of opportunities are also being shown up. One of the major opportunities is development of utility scale wind farm itself as a way to support in severe power crisis the country is facing. Due to comparatively lower installation period of wind turbines compared to hydro power plant construction, it can be expected that the government will prefer to harness clean natural resources instead of importing highly expensive and polluting diesel fired technology to lower the mismatch between supply and demand of electricity. However, due to less engagement, the wind energy sector lacks highly skill human resources pertaining to wind data analysis, detail feasibility studies and wind power planning from policy levels to professional levels resulting in low level of confidence on realization of wind turbine. Hence, with the very realization of this fact, AEPC had organized 7-days technical training on wind energy sector in 2013 with the technical and financial support from Global Sustainable Electricity Partnership (GSEP), where 33 participants from various sectors were trained.

Installation of Met mast (data logger for wind data measurement) and monitoring of wind data for at least one year is another important activity that AEPC has continuously been putting effort so far long. Till the end of FY 2068/69, altogether 13 number of met mast had been stalled and retrieved the wind data accordingly. During the FY FY 2070/71, AEPC had installed met mast in Morang, Panchthar, Sindhuli and Makawanpur from where periodic data has been reported to AEPC from respective consultants.

Recently AEPC is giving high priority to wind-solar hybrid system promotion after successful completion of 10 kW wind- 2 kWp solar hybrid pilot projects in Dhaubadi, Nawalparasi district, Nepal under technical and financial support from ADB. Recently pre-feasibility study of 20 potential sites (In first Phase 10 sites in FY 2068/69 from ESAP II and in II phase next 20 sites in FY 2069/70 and 70/71 from Gov core fund) for wind- solar hybrid projects has been conducted and it was found that 28 sites out of 30 are recommended as feasible for project implementation. As AEPC has its district level institutional arrangement called District Energy & Environmental Section/Unit (DEES/U) recent decision has been made at management level to mobilize all the resources of DEES/U to identify further non studied and unexplored potential and feasible sites for the implementation of wind-solar hybrid projects where no other RE interventions are possible for rural electrification so that at the end of this FY 071/72 (up to mid July, 2015), 100 potential sites for the implementation of wind- solar hybrid project will be identified. Beside that AEPC has very good experience of promoting small wind turbine system. Till date AEPC has supported more than 30 kW wind projects in different location of the country and wind data measurement has been taken from 14 most potential sites of Nepal. Within this FY, AEPC is planning to conduct wind data measurement of 5 more potential sites and support 50 kW wind project under Public Private Partnership (PPP) model.

Recently, ADB and the Government of Nepal has signed in a new project called South Asia Sub regional economic cooperation: Power System Expansion Project (SASEC:PSEP). The project have a period from 2015 till 2020. This project has a target of adding 500 kW additional electricity from off-grid wind and or wind solar hybrid projects in Nepal. AEPC is the implementing agency for the project.

Similarly, World Bank funded Renewable Energy Resource Mapping project (ESMAP) with the fund of about 3 million USD is going to be implemented from January 2015 for detail resource mapping of wind energy in Nepal and to prepare wind energy resource atlas by the end of 2017.

Wind data measurement statistics

SN	District/Places	Period	Remarks
1	Okhaldhunga	(Apr 2001-Aug 2005)	Data Can be made available upon request to AEPC
2	Nagarkot (Bhaktapur)	(Jun 2001-Apr 2006)	
3	Butwal (Rupandehi)	(Mar 2001-Aug 2003)	
4	Kagbeni (Mustang)	(Apr 2001-Feb 2006)	
5	Thini (Mustang)	(Apr 2001-Jun 2007)	
6	Batase Danda (Palpa)	(Sep 2003-Dec 2006)	
7	Ramechhap	(Jul 2005-Oct 2007)	
8	Phakhel (Makwanpur)	(Oct 2007-April 2009)	
9	AEPC building	(Feb 2009-March 2009)	
10	Neta (Pyuthan)	(Dec 2007-Feb 2011)	
13	Tangbe, Mustang	2012-14	
12	Makawanpur	2013-2014	Ongoing
23	Morang	2013-2014	

Future Plan and Targets:

Within this thirteenth plan (2070/71-72/73), 1000 kW of electricity will be generated from wind energy. Met mast will be installed including data logger And sensor for wind data monitoring in 30 additional sites that will be helpful in developing wind resource map (Wind energy atlas). As a replication of successful pilot project on wind solar hybrid Minigrid technology, detail feasibility study will be conducted for thirty rural villages for rural electrification. In addition to this, wind mills will be promoted for water pumping in Terai districts based on demand received.

Innovation in Creating LCDS Market

Background and Rationale

Nepal has made a significant stride in recent years in developing the Rural and Renewable Energy (RRE) sector with a Public-Private Partnership (PPP) model working for most of the sub-sectors and this has been considered a model worth replicating in other countries with similar socio-economic conditions. Despite all the success and the integrated national framework programme, the sector has several issues around capacity of the actors, particularly at the ground level for quality and timely delivery of the planned activities and meeting the targets. It is high time in Nepal that a proper market mechanism must be developed in the country for Local Capacity Development Services (LCDS) at the sub-national level that is based on market principles. LDCS includes human resource development, preparation and implementation of organizational development plans, business plans, strategic plans, etc. which will enable organizations at sub-national levels to enhance their performance in meeting targets.

Local Capacity Development Facility (LCDF)

Local Capacity Development Facility (LCDF) is a mechanism to improve the market environment at sub-national level. LCDF is to broker and finance innovative technical assistances in order to i) strengthen demand for LCDS, ii) support LCDS expertise development, quality improvement and outreach, and iii) set financing examples, business models and link with financing from other programs for innovative and successful LCDS that brings positive impact on livelihoods of people.

RE-Source: LCDF in Nepal

Alternative Energy Promotion Centre (AEPC) is establishing RE-Source (Renewable Energy-Source) as a separate wing with support from SNV Netherlands Development Organization. RE-Source is designed and being implemented under AEPC's National Rural & Renewable Energy Program

(NRREP) framework with complementing roles. Regular NRREP activities focus on the energy market development, while RE-Source activities focus on the LCDS market development, through appropriate brokering, capacity development and co-financing LCDS activities.

Re-Source Goal, Objectives & Outputs

Overall Goal: The overall goal of RE-Source is to enhance inclusive access of rural households and enterprises to affordable Rural and Renewable Energy, through greater quality, diversity and outreach of TA services through creation of sustainable market mechanism for rural stakeholders such as private companies, cooperatives / MFIs, local government bodies, local NGOs and CBOs.

The following are specific objectives of RE-Source

1. Brokering: create and disseminate information about LCDS market, supports being provided to strengthen it, through appropriate channels or events.
2. Service Development: stimulate quality and professional development in the LCDS market towards improved outreach at affordable price, through capacity development of LCDS suppliers and others and by showing LCDS business opportunities under NRREP.
3. Co-Financing: demonstrate alternative funding mechanisms and business models that stimulate direct interaction between LCDS providers and the service seekers, including some pilots as a proof of concept.

The following are specific outputs of RE-Source

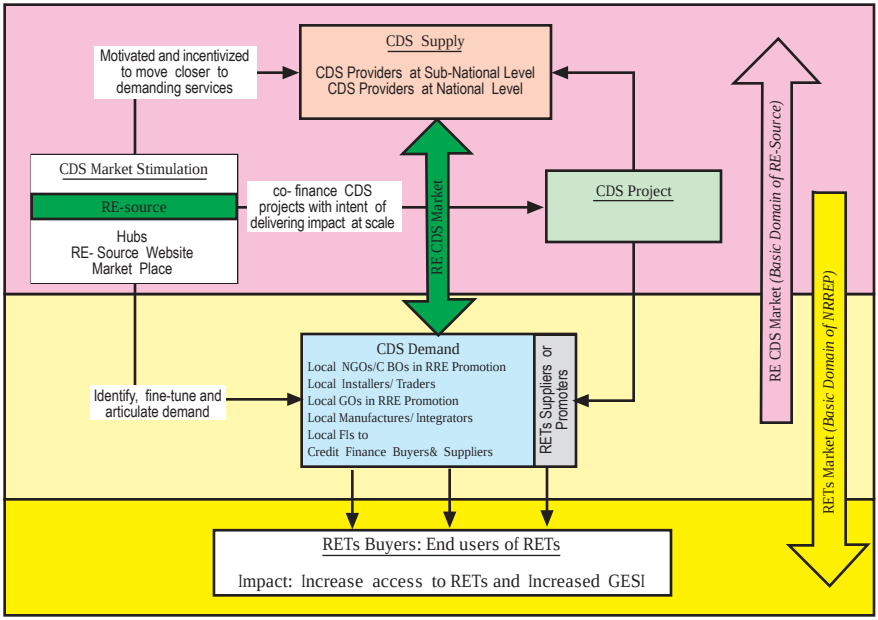
1. Functional Market: CDS market functioning at sub-national levels with interplay of demand and supply.
2. Quality & Price: LCDS quality improved significantly, while price is affordable.
3. Sustainability & Innovation: LCDS market is capable to sustain and innovate with little or no external support.

Re-Source Design & Implementation

RE-Source does not provide LCDS by itself, but it creates environment for market development with quality LCDS at affordable prices. RE-Source as a wing of AEPC, has a Management Committee having representation from other relevant stakeholders for policy and program management oversights and a

secretariat with minimum devoted staffs for day-to-day management of the program activities.

Scope of RE-Source vis-à-vis that of Regular NRREP Capacity Development Activities



There are four categories of activities that RE-Source does:

1. Stimulation of the Market: RE CDS market will be stimulated at sub-national levels through relevant studies researches, information sharing, market place events, etc.
2. Support to the Demand Side: those who need CDS will be supported to identify, fine-tune and articulate their demands in such a way that appropriate suppliers understand. This can be done through appropriate means, including working with RE-Source Hubs.
3. Support to the Supply Side: those providing CDS will be motivated and incentivized to move closer to those demanding services (at sub-national), thereby increasing relevance, accountability and impact of their services.
4. Projects: identify unique CDS projects which have higher impact potential and co-finance them with intent of delivering impact at scale through catalytic CDS interventions