Government of Nepal

SCALING-UP RENEWABLE ENERGY PROGRAM

INVESTMENT PLAN FOR NEPAL

Draft of 11 September 2011

CONTENTS

ANNEXES

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AEPC	Alternative Energy Promotion Centre
AEPB	Alternative Energy Promotion Board (to supersede AEPC)
BCF	Biogas Credit Fund
BSP	Biogas Support Program
BSP-N	Biogas Sector Partnership, Nepal
CAGR	Compound Annual Growth Rate
CBO	Community Based Organisation
CEF	Community Energy Fund
CESP	Community Energy Service Providers
CNI	Confederation of National Industries
CREF	Central Renewable Energy Fund
DEEU	District Energy and Environment Unit (of DDC)
DEES	District Energy and Environment Section (of DDC)
DDC	District Development Committee
DoED	Department of Electricity Development
EIA	Environmental Impact Assessment
EPC	Engineer, Procure and Construct
ESAP	Energy Sector Assistance Program
EU	European Union
FNCCI	Federation of Nepalese Chamber of Commerce and Industries
GEF	Global Environment Facility
GHG	Greenhouse gases
GoN	Government of Nepal
GPOBA	Global Partnership on Output Based Aid
HH	Household
IFC	International Finance Corporation
IPP	Independent Power Producer
IPPAN	Independent Power Producers' Association, Nepal
IWM	Improved Water Mill
KfW	Kreditanstalt fur Wiederaufbau
LFI	Local Financial Institution
MDB	Multilateral Development Bank
MFI	Micro Finance Institution
MoEn	Ministry of Energy
MoEnv	Ministry of Environment
MoF	Ministry of Finance
O&M	Operation and Maintenance
NEA	Nepal Electricity Authority
NGO	Non-governmental Organisation
NPC	National Planning Commission
NRB	Nepal Rastra Bank (Central Bank)
PDF	Power Development Fund of PDP
PDP	Power Development Project
PFI	Participating Financial Institution
PHP	People's Hydropower Program
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
PV	Photovoltaic
REF	Rural Energy Fund
REP	Renewable Energy Project
RREP	Rural and Renewable Energy Program
REDP	Rural Energy Development Program
RERL	Renewable Energy for Rural Livelihood
RET	Renewable Energy Technologies
SHP	Small Hydro Power
SHF	Small Hydropower Fund
SHS	Solar Home System
SME	Small and Medium Enterprise
SREP	Scaling-up Renewable Energy Program
SREP-IP	SREP Investment Plan
SWAp	Sector-Wide Approach
TA	Technical Assistance
UNDP	United Nations Development Programme
VDC	Village Development Committee
WB	World Bank
WECS	Water and Energy Commission Secretariat
Wp	Watt Peak

TERMINOLOGY USED IN SELECTED TECHNOLOGIES

Hydro Power[1]

Small hydro power: > 1 MW to 25 MW, but limited to 10 MW for projects under the Scaling-up Renewable Energy Program (SREP). They are usually grid-connected, with or without reservoirs. For the purpose of the SREP Investment Plan, small hydro power (SHP) is more narrowly defined as projects in the range 1 to 10 MW. The discussion on SHP in this document thus pertains to projects in the capacity range relevant to SREP financing.

Mini hydro power: 100 kW to 1 MW. They are usually run of the river projects that serve nearby consumers through a mini grid.

Micro hydro power: > 5 kW to < 100 kW. They are run of the river projects that serve nearby consumers through a mini grid.

Pico hydro power: Very small localised plants up to 5 kW.

Water turbine mill: Hydro power plants that generate only mechanical power, typically in the range 5-20 kW. Used mainly for powering agro processing machinery through a belt drive.

Improved water mill: Improved version of the traditional water wheel, with a vertical axis and metal runner. Used mainly for grinding and hulling, but can also be used for electrifying a small number of households.

Biogas

Biogas is a mixture of gases mainly comprising methane (50-70%) and carbon dioxide (30-40%) produced by methanogenic bacteria feeding on biodegradable materials such as animal dung under anaerobic conditions. Biogas plants are categorised as either 'domestic' or 'institutional/community' based on ownership and usage. Plant sizes typically range from 2 m^3 to 100 m^3.

Solar PV

Solar photovoltaic (PV) systems typically comprise a solar PV module that produces DC electricity, storage battery, charge controller and associated wiring and mounting structures. Inverters are used when AC electricity is desired, particularly for larger applications. Solar PV systems are mostly used for lighting (solar home systems and solar lanterns), communications and water pumping.

[1] Renewable Energy Data Book 2009, AEPC and other sources

EXECUTIVE SUMMARY

Objectives

This is Nepal's Investment Plan for funding under the Scaling-up Renewable Energy Program (SREP). The objectives of SREP in Nepal are to: (i) leverage complementary credit, grant and private sector equity cofinancing, (ii) bring about transformational impacts through scaling up energy access using renewable energy technologies (RETs), poverty reduction, gender and social inclusiveness and climate change mitigation, and (iii) ensure sustainable operations through technical assistance and capacity building.

Country and Renewable Energy Sector Context

Nepal is presently facing an energy crisis of unprecedented proportions. The 706 MW total installed capacity of Nepal Electricity Authority, supplemented by net purchases from India, is inadequate to meet demand. Load shedding has thus become the rule of the day, with attendant economic consequences. In this context renewable energy development, both on-grid and off-grid, is a high priority program of the government that has been supported through the enactment of relevant policies and national plans to attract private sector participation. These include targeted subsidies and funding mechanisms; tax and duty concessions; and exemption of mini, micro and pico hydro projects from royalties and licensing requirements.

Renewable energy is a high priority sector of the government, which has a goal of increasing the share of renewables from less than 1% to 10% of the total energy supply, and to increase the access to electricity from alternative energy sources from 10% to 30% within the next 20 years. Complementing these goals, the government plans to invest USD 1,076 million in renewable energy by 2020, which will include support for hydropower, solar PV and biogas technologies.

Several donor assisted programs have been initiated in the past in the renewable energy sector, many with follow on projects. However, most of them will be completed during 2011-12, and development partners are presently designing cooperation programs in consultation with government. The SREP initiative will thus be a part of the larger program and add value to the overall renewable energy development of the country.

Expected Outcomes

The main outcomes expected are:

- Additional financing leveraged with other development partners and private sector equity to achieve government's goal in scaling up energy access, both on-grid and off grid, through renewable energy sources;
- Mainstreaming of commercial lending through financial institutions for renewable energy projects;
- Rapid takeoff of small hydro power projects;
- Environmental, social and gender co-benefits such as reduction of GHG emissions, mitigation of damage to forest cover, productive end use of energy, extended hours for domestic work and children's education, improved access to information and empowerment of local communities, particularly women;

- Rationalised fund delivery for mini and micro energy projects through a single channel (the proposed Central Renewable Energy Fund) with different windows for disbursing credit, subsidies and technical assistance; and
- Transition of Alternative Energy Promotion Centre into Alternative Energy Promotion Board, which will serve as a one-stop shop for renewable energy development in the country for projects up to 10 MW in capacity.

Program Criteria and Priorities

Considering the amount of funding available under SREP and the need to focus, only selected renewable energy options have been considered for assistance. They were evaluated against the SREP eligibility criteria based on (i) leverage (ii) transformational impact, and (iii) sustainability. Related barriers, risks and mitigation measures were also considered in their selection.

Accordingly, the SREP financing will focus on the development of small, mini and micro hydro power, solar PV and biogas projects together with technical assistance and capacity building, while complementing a larger program which will include other development partners and more renewable energy technologies.

Physical Targets

The following overall program targets have been used in preparing the SREP Investment Plan, which covers the period October 2012 to September 2017:

Small hydropower	...	...	50 MW
Mini & micro hydropower		...	30 MW
Solar home systems	...	...	500,000 systems
Biogas, domestic	...	...	140,000 plants
Biogas, institutional	...	...	10,000 plants

Financing Plan, USD '000

Investment	**GoN**	**SREP Initial Allocation**	**RREP**	**Other** (To be determined)	**Private Sector Equity**	**Total**	**% of Total**
Small hydro power		20,000		58,750	33,750	112,500	21
Mini & micro hydro	20,000	5,579	56,944	24,144	26,667	133,333	25
Solar home systems	18,750	5,231	53,385	22,635	25,000	125,000	24
Biogas, domestic	17,500	4,882	49,826	21,126	23,333	116,667	22
Biogas, institutional	4,688	1,308	13,346	5,659	6,250	31,250	6
Other RETs	1,500		6,500		2,000	10,000	2
Technical assistance		3,000				3,000	1
Total	**62,438**	**40,000**	**180,000**	**132,313**	**117,000**	**531,750**	**100**

'Other' represents the funding gap to be bridged with support from donors and commercial financing. It is expected to be at least partially addressed through an allocation of USD 10-15 million from the USD 60 million available as SREP Reserve.

1.0 INTRODUCTION

1. Nepal is one of six countries identified for assistance under the Scaling-up Renewable Energy Program in Low Income Countries (SREP). As one of three programs under the Strategic Climate Fund, SREP aims to demonstrate the social, economic and environmental viability of low carbon development pathways in the energy sector. In particular, the objectives of SREP in Nepal are to: (i) leverage complementary credit and grant cofinancing, (ii) bring about transformational impacts through scaling up energy access using renewable energy technologies (RETs), poverty reduction, gender and social inclusiveness and climate change mitigation, and (iii) ensure sustainable operations through technical assistance and capacity building.

2. The Government of Nepal (GoN) has appointed the Ministry of Finance (MoF) and the Ministry of Environment (MoEnv) as the focal points for SREP preparation. MoEnv has designated the Alternative Energy Promotion Centre (AEPC) as the lead agency for SREP-related activities under the guidance of a Steering Committee chaired by the Secretary, MoEnv.

3. This document is Nepal's SREP Investment Plan (SREP-IP), prepared by the SREP Steering Committee with assistance from consultants and inputs received from a wide array of stakeholders including national and private sector institutions, industry associations, development partners and civil society. It complements the government's current Three Year Plan (2010-2013) and beyond for increasing the access to energy services from alternative energy sources.

4. Multilateral Development Banks (MDB) comprising the Asian Development Bank (ADB), World Bank (WB) and International Finance Corporation (IFC) jointly provide assistance and oversight for the Nepal SREP in collaboration with other development partners including the UN and bilateral agencies. ADB acts as the SREP country focal point.

5. A chronology of key events leading to the preparation of the SREP-IP is given below:
   - Joint MDB Scoping Mission, 3-8 February 2011;
   - Approval of an advance SREP-IP preparation grant in April 2011;
   - Joint MDB Programming Mission, 4-11 July 2011 that included stakeholder consultative workshops on small hydro power (SHP) and mini & micro energy initiatives on 6 July 2011 (**Annexes 1 & 2**);
   - A stakeholder consultative workshop to review the final draft of the SREP-IP was held in Kathmandu on 9 September 2011, which was followed by the second and final Joint MDB Programming Mission,21-23 September 2011; and
   - Finalisation of SREP-IP, 30September 2011.

2.0 COUNTRY CONTEXT

2.1 Overview

6. **Economy.** Nepal is a landlocked Himalayan country with an area of 147,181 km^2 and population of 28.6 million[2]. It is a Less Developed Country with a human development index (HDI) of 0.428[3] and per capita nominal GDP of USD 642. The annual GDP growth rate estimated for the fiscal year 2010-11 is 3.47%[4]. More than one third of the GDP is derived from the agriculture sector. Remittance, which is over 23% of GDP, is the main source of cash income for a majority of households (HH). Income inequality and low pay for women, especially in the informal sector, are some of the characteristics of the economy.

7. **Socio-political.** Nepal has a multiethnic society, but social discrimination still persists in terms of gender and caste, especially in the remote and rural areas. The country is in the state of political transition and is in the process of transforming the unitary system of government into a federal one. Constitution making has been a very challenging task. Political instability and uncertainties, and the lack of elected representatives particularly at the local level are affecting the course of development.

8. **Geography.** Nepal comprises three ecological bands or regions that straddle the country: the Mountain Region in the north that borders with China, Hill Region in the middle which contains valleys (in which the capital city Kathmandu is located), and the fertile Terai Region (flatland) to the south that borders with India.

9. **Population distribution.** Approximately 53% of the population live in the Hill Region (including about 5% in Kathmandu valley) and 40% in the Terai. About 83% of the population lives in rural areas, with agriculture as the main occupation[5].

10. **Energy consumption pattern.** Total energy consumption in Nepal in the year 2008/09 was about 9.4 million tonnes of oil equivalent (401 million GJ) of which some 87% was derived from traditional resources such as woody biomass and animal waste, 1% from small renewable energy sources, and only about 12% from commercial energy sources such as petroleum and fuel products and electricity from small to large hydropower plants. Petroleum products, which account for about 8% of the total energy consumed, require one third of the foreign exchange earnings on importing these fuels (mainly petrol, diesel and kerosene). Electricity represents only 2% of the total energy consumption in 2010. In the residential sector, biomass contributes about 96% of the total energy consumed. This high reliance on biomass has been the main reason for deforestation over the years.

11. The shortage of power and frequent power outages have severely constrained the growth potential of the country. Nepal's power generation capacity of 706 MW, which is predominantly hydropower, is insufficient to meet growing demand and has led to over 14 hours of load-shedding in a day during the winter (low river flow) season. Nepal, which built its first hydropower plant in 1911 when the 500 kW Pharping was constructed, has an

[2] Estimate for 2011, Central Bureau of Statistics

[3] Human Development Report 2010

[4] GDP 2011, Texts and Tables, Central Bureau of Statistics

[5] Population Profile of Nepal - 2007, Central Bureau of Statistics

estimated technically feasible hydropower potential of 42,000 MW, but much of this very significant potential is yet to be developed.

12. About two thirds of HH use firewood as their main source of fuel for cooking, followed by LPG (12 %), cow dung (11%), biogas (2.4%), and kerosene (1.4%). However, LPG is the main source of fuel for cooking in urban areas (52%), and the proportion is even higher in the urban areas of Kathmandu valley (83%).

13. In rural areas, 75% of HH use firewood for cooking. It is 36% in urban areas. Ecologically, firewood is the major source of cooking fuel in the Mountain (88%), Hill (76%) and Terai (58%) regions. The second common source of cooking fuel in the Hill and Mountain regions is LPG, which serves 18% and 6% of HH respectively, whereas in Terai region cow dung serves as cooking fuel to 21% of HH. Firewood remains the main source of fuel for cooking in all regions, and ranges from 53% in the Central to as high as 91% in the Mid-Western regions.

14. **Electricity access.** A little over half (56%) of HH in the country have access to electricity (including off-grid solutions)[6]. On the other hand, 33% of HH still depend largely on kerosene for lighting. Almost all (99.7%) HH in the urban areas of Kathmandu valley have access to electricity.

15. Among five administratively defined development regions[7], the Western development region has the highest proportion of HH using electricity (63%), while the Mid-western development region has the lowest (34%).

16. By ecological regions, the Mountains have the least proportion of HH that use electricity (41%). The proportion of HH using electricity in the Hills (56%) and Terai (59%) are slightly higher.

17. As to be expected, urban areas have better access to electricity relative to rural areas (93% versus 49%)[8].

18. **Regional context.** The per capita primary energy consumption of Nepal (14 GJ) is one of the lowest in the region, just above Bangladesh. In comparison with neighbouring countries, it is 52 GJ in China and 22 GJ in India. The Asian average is 26 GJ. In the context of electricity consumption, Nepal's case is among the lowest, with just 69 kWh per capita[9].

2.2 Electricity Demand and Supply

19. At present, the Integrated Nepal Power System (INPS) has a total installed capacity of some 706 MW of which 652 MW (92%) is generated from hydro resources[10]. The annual electricity generation on the grid system in 2009-2010 was about 3,690 GWh, of which about 57% was generated by power plants owned by the Nepal Electricity Authority (NEA), 26% by IPPs, and the remaining 17% was imported from the Indian grid. The power system has about 1,854,275 customers, which is an increase of 10.6% from the previous year.

[6] AEPC Annual Progress Report, FY 2009-10

[7] Nepal is divided into five development regions, namely, Eastern Development Region, Central Development Region, Western Development Region, Mid-Western Development Region, and Far Western Development Region

[8] Nepal Labour Force Survey 2008, Central Bureau of Statistics

[9] National Energy Strategy Nepal 2010, WECS

[10] NEA Annual Report 2011

20. The peak load in Nepal occurs during the winter when the run-of-river power plants generate at a lower capacity (compared to the installed capacity) due to low river flows. According to the NEA, the peak demand in 2010 was 885 MW, which was an increase of 9% over the previous year. The annual energy demand was 4,367 GWh resulting in a shortfall of some 676 GWh, resulting in load shedding of 12-14 hours per day.

21. The peak demand met by NEA rose steadily from 603 MW in 2006 to 946 MW in 2011 (with the excess over installed capacity supplemented by purchases from India), indicating a compound annual growth rate (CAGR) of 9.4%. Likewise, the total available energy increased from 2,781 GWh to 3,858 GWh at a CAGR of 6.8% during the same period.

22. The total number of consumers increased at a CAGR of 10.0% from 1.28 million in 2006 to 2.05 million in 2011, of which 95% comprise domestic connections.

23. Electricity sales by NEA increased from 2,033 GWh in 2006 to 2,735 GWh in 2011at a CAGR of 6.1%. In terms of composition, the domestic sector accounted for 43% of the total consumption in 2011, followed by the industrial sector at 38%. Consumption by other sectors is very much smaller, and comprised commercial (7.5%), non-commercial (4.0%), street lighting (2.4%), water supply & irrigation (2.0%), community sales (1.7%), and bulk supply to India (1.1%), with negligible amounts consumed by transport and temples.

2.3 Demand Forecast by NEA and Issues

24. The energy and demand forecast for the financial years 2010-11 to 2027-28 is provided in the Table 2.1 below. The electricity demand is forecast to reach about 3,679 MW in the financial year 2027-28, (medium growth scenario) which is an increase of some 2,800 MW from the present peak demand. The energy forecast indicates an energy output of 17,404 GWh by fiscal year (FY) 2027-28.

Table 2.1 Nepal Power System Load Forecast

Fiscal Year	Energy (GWh)	System Peak Load (MW)
2010-11	4,430.70	967.10
2011-12	4,851.30	1,056.90
2012-13	5,349.60	1,163.20
2013-14	5,859.90	1,271.70
2014-15	6,403.80	1,387.20
2015-16	6,984.10	1,510.00
2016-17	7,603.70	1,640.80
2017-18	8,218.80	1,770.20
2018-19	8,870.20	1,906.90
2019-20	9,562.90	2,052.00
2020-21	10,300.10	2,206.00
2021-22	11,053.60	2,363.00
2022-23	11,929.10	2,545.40
2023-24	12,870.20	2,741.10
2024-25	13,882.40	2,951.10
2025-26	14,971.20	3,176.70
2026-27	16,142.70	3,418.90
2027-28	17,403.60	3,679.10

Source: NEA Annual Report, 2009/10

25. Achieving the above targets present several challenges. The unreliable and inadequate power supply continues to be a severe constraint on infrastructure development and economic growth. There has been insufficient investment in generation, transmission and distribution, and private investors and development partners have been reluctant to invest in the power sector because of several factors. These include:

- Weak governance and institutional structure;
- Lack of institutional arrangements to mobilise the private sector;
- Limited availability of domestic funds;
- Low consumer tariffs (not revised since 2001) that do not reflect present costs[11];
- High technical and commercial losses, coupled with inadequate attention to operation and maintenance (O&M);
- A financially stressed public sector utility; and
- Inadequate human resource capacity.

26. Notwithstanding the above, some progress is being made in addressing the power deficit. The recently approved World Bank-assisted cross border transmission project with India will help in reducing load shedding. The ETFC is also being reconstituted to review cost and retail tariff under the current ADB-supported intervention. Likewise, some transmission improvement projects are being undertaken with World Bank and ADB assistance. However, despite the efforts of GoN, the issue of grid-connected access in new areas will remain a challenge in the long-term, and will be one of the areas addressed by SREP.

2.4 Electricity Tariff[12]

27. Gross revenue of NEA from electricity sales increased from NPR 13,972 million in 2006 to NPR 19,577 million in 2011 at a CAGR of 7.0%.

28. NEA determines the electricity tariff based upon the 'revenue requirement' method. However, NEA has not revised its tariff since September 2001, which is thus no longer reflective of current costs. For micro hydro, although there are guidelines to determine the tariff, a general rule of thumb NPR 1.00 per Watt per month is often used.

29. The tariff employed by NEA has 11 categories and uses a mix of minimum charge (with or without a portion of exempt kWh), energy charge and monthly demand charge. In addition, NEA has a Time of Day tariff for consumers connected to 11 kV, 33 kV and >66 kV. Details are given in **Annex 3**.

2.5 Small Hydro Power

30. Nepal's power generation capacity of 706 MW, which is predominantly hydro power, is insufficient to meet current demand, which continues to grow. On the other hand, the country has an estimated 42,000 MW of technically feasible hydropower potential (including large hydro power) which has not been adequately developed. **Annex 6** provides details on the current status of small hydro power (SHP) projects in the country.

[11] The current PPA revision applies only to those IPPs that complete projects within a specified time period (Annex 3)
[12] NEA Annual Report 2011

2.6 Mini and Micro Energy Initiatives

31. Several RET-based interventions with assistance from development partners have been initiated in the past in the mini and micro energy sector, many with follow-on projects that are still in operation. Projects presently under implementation through the AEPC are summarised in Section 3 that follows.

3.0 RENEWABLE/RURAL ENERGY SECTOR CONTEXT

3.1 Government's Policy and Targets for the Sector

32. Renewable energy development continues to be a high priority program of government as it provides a least cost solution to remote, sparsely populated areas unviable for grid extension, while being clean, safe and environmentally friendly[13]. GoN's goal for the next 20 years is to increase the share of renewable energy from less than 1% to 10% of the total energy supply, and to increase the access to electricity from alternative energy sources from 10% to 30%[14].

33. The government plans to invest USD 1,076 million in renewable energy by 2020, which will include support for hydro power, solar PV and biogas technologies. The sources of funds envisaged include government revenue, support from development partners, loan financing from financial institutions and private equity.

34. The low coverage of the national grid, increasing demand for rural electrification, appropriateness of decentralised energy systems in sparsely populated rural settlements, availability of alternative energy resources, and the need to respond to climate change are some of the key drivers for increasing investment in the renewable energy sector.

35. Complementing the above, the current Three Year Plan (2010-2013) envisages the addition of 15 MW of mini/micro hydro power; 225,000 solar home systems; 90,000 domestic, 50 community and 75 institutional biogas plants; 1 MW of wind power; and 4,500 improved water mills[15].

36. For over two decades GoN has been striving to provide access to modern energy services in remote rural areas, and more recently through the enactment of policies and plans. The policies include Rural Energy Policy 2006; Subsidy Policy for Renewable (Rural) Energy, 2009 and Renewable (Rural) Energy Subsidy Delivery Mechanism, 2010. They provide detailed guidelines on the institutional mechanism, subsidy criteria and delivery mechanism, including the setting up of a Renewable Energy Fund (REF), with AEPC playing a pivotal role. The subsidies, usually cofinanced with donor funds under specific projects or programs, are primarily aimed at supporting low income rural households (HH) access energy services as well as environmental protection.

[13] See section 5.4 on co-benefits

[14] Presentation by AEPC on Scaling-up Renewable Energy Program in Nepal, 6 Feb 2011

[15] Ibid

37. Other enabling measures include the establishment of national, district, and community rural energy funds; tax and duty concessions and exemption of mini, micro and pico hydro projects from royalties and licensing requirements.

38. **Annex 4** provides a summary of the subsidies and other government incentives available for projects employing RETs.

39. Although the Rural Energy Policy 2006 has already been promulgated, its execution needs various acts as defined by the policy and more. Some important acts like Rural Energy Act, Central Co-ordination Act, Central Rural (Renewable) Energy Fund Act, Feed in Tariff Act and Alternative Energy Promotion Board (AEPB) Act are in the preparatory stages. Considering the present political situation, it may take some time to get these approved by parliament.

40. Other factors affecting RET development include: (i) incomplete regulations regarding renewable energy (due to lack of detail in implementation modalities, by-laws and guidelines relating to the Rural Energy Policy and Smart Subsidy Policy); (ii) weak enforcement and knowledge of national renewable energy policies and the Rural Energy Policy 2006, in particular at district and village level; (iii) absence of a government endorsed framework for PPP models in the RE sector (including revenue sharing models).[16]

41. Official support for rural energy development (also referred to as renewable energy) has been put into practice starting from GoN's Sixth Five Year Plan (1980-1985)[17]. The allocations to RET development under various development plans of Nepal are summarised below:

- Sixth Five Year Plan: GoN provided a subsidy of NPR 2.67 million to micro hydro entrepreneurs through the Agricultural Development Bank of Nepal;
- Seventh Five Year Plan (1985-1990): GoN made specific reference to the RET sector as a means of providing benefits to its rural population and conserving forest resources;
- Eighth Five Year Plan (1992-1997): GoN provided NPR 330 million in the form of subsidies for the development of micro hydro, biogas, solar, biomass and wind energy projects;
- Ninth Five Year Plan (1997-2002): An ambitious target set for RETs with a total outlay of NPR 5,548 million. Of this, GoN provided NPR 776 million (14%), with the balance leveraged with private sector and donor funding;
- Tenth Five Year Plan (2002-2007): The estimated investment in RETs was NPR 4,587 million, with GoN contributing NPR 550 million;
- Following the Peoples' Movement of 2006, a Three Year Interim Plan (2007-2010) was developed by the National Planning Commission (NPC). Under this plan the total investment in RET was NPR 4,957 million, of which about 80% is in the form of subsidy from GoN and donors;
- In the current Three Year Plan (2010-2013), the estimated investment in RETs is NPR 7,107 million, of which the GoN will contribute NPR 1,350 million in the form of subsidy. The Plan recognises the importance of public-private partnerships (PPP)

[16] RERL Program document

[17] National Planning Commission Reports (various)

in power development, and has for the first time, introduced a policy to promote 'people's hydro power' (PHP) under the leadership of local government, with the participation of local institutional capital. The Plan also sets an ambitious target of providing electricity to an additional 7% of the rural population through RETs.

- Expenditure on RETs over the past decade has been around NPR 12 billion. However, current expenditure is close to NPR 3 billion p.a.[18]

42. Other relevant energy sector policies of GoN include the following:

- Hydropower Development Policies 1992 and 2001, Water Resources Act 1992, and Electricity Act 1992: These inter alia aimed to encourage domestic and foreign private sector investment to develop hydropower in the country through various fiscal and other incentives; creation of a rural electrification fund; and demand side management and energy conservation. While the necessary regulations to attract private investment have yet to be passed, GoN's decision to scrap the income tax holiday and raise royalty payments was an impediment to private sector participation.
- Water Resources Strategy 2002 and National Water Plan 2005: These sought an integrated water resource management with sustainable social and economic development, including the development of hydropower capacity.
- Nepal Electricity Regulatory Commission Bill 2064 (2007-08): This was drafted to form a regulatory body to balance supply and demand, to set the electricity tariff, encourage competition and transparency in electricity market, and to protect the rights of the consumers. The Bill has not yet been passed by Parliament.
- National Electricity Crisis Resolution Action Plan 2008: Introduced to overcome the acute power shortages in the country, the Plan included power purchase by NEA at a flat rate from IPPs up to 25 MW, an income tax holiday, acceptance of an Initial Environmental Examination instead of an Environmental Impact Assessment for projects implemented by 2011. Concessions under the Plan included an 80% government subsidy for plants below 1 MW capacity. Although the Action Plan had good provisions for the solution of the energy crisis, it was not implemented because of a change of government, and new government did not take up it with the same spirit.
- Reports of the Task Force for Generating 10,000 MW Hydropower in 10 Years (2011-2020) and 25,000 MW Hydropower in 20 Years (2011-2030): These reports contain a list of hydropower projects at various stages of development, deal with sources of investment funds, identify the barriers to hydropower development and finally suggest measures to overcome these barriers.
- National Energy Strategy 2009: WECS coordinated the energy strategy formulation exercise. It has designed the implementation modalities of the policies and strategies developed in the National Water Plan 2005 with regard to the development of hydropower in Nepal. It also deals with the development of the RET sector.
- Sector Wide Approach (SWAp): Following a feasibility study concluded in July 2010, AEPC is proceeding with an implementation study to introduce SWAp for the rural/renewable energy sector. SWAp aims to promote a unified approach, delivery based on policy targets, and a joint approach to capacity development among key stakeholders.

[18] AEPC Planning Unit

3.2 Energy Sector Institutional Structure

43. **National Planning Commission (NPC).** As the advisory body for formulating development plans and policies of the country under the directives of the National Development Council, NPC explores and allocates resources for economic development; and works as a central agency for monitoring and evaluation of development plans, policies and programs. Besides, it facilitates the implementation of development policies and programs; provides a platform for exchange of ideas, discussion and consultation pertaining to economic development of the country; and also serves as an institution for analysing and finding solutions to the problems of civil society, non-governmental organisations and the private sector in the country.

44. **Ministry of Energy (MoEn).** Established in 2009 through a reorganisation of the former Ministry of Water Resources, MoEn is mandated to manage Nepal's energy sector. Its role is to develop energy resources to accelerate the social and economic development of the country, which include areas such as: policy development, planning, energy conservation, regulation; research and studies for energy and its utilisation; construction, operation, maintenance and promotion of multipurpose electricity projects; promotion of private parties in electricity development; matters related to bilateral and multilateral agreements regarding energy and electricity; matters related to tax; and coordination of institutions related to the sector.

45. **Department of Energy Development (DoED).** As a department under MoEn, DoED is primarily responsible to ensure transparency of the regulatory framework; accommodate, promote and facilitate private sector participation in power sector by providing a 'One Window' service; and issue licences for power projects.

46. **Nepal Electricity Authority (NEA).** Set up in 1985 through a merger of related government bodies, NEA is structured as a vertically integrated government-owned utility that is responsible for generation, transmission, distribution of electricity and related engineering services. In addition, it recommends to government long and short-term plans and policies in the power sector and tariff structure for electricity. NEA is the only domestic off-taker of power in the country and thus all domestic independent power producers (IPPs) require a power purchase agreement (PPA) from NEA to sell power to the grid.

47. As of mid-2011, NEA had a total installed capacity of 706 MW, which is supplemented by net purchases from India, particularly during the dry winter months (Table 3.1).

Table 3.1: Composition of NEA's Installed Capacity[19]

Source	MW	% of Total
Major Hydro (NEA) - grid connected	472.99	67.0
Small hydro (NEA) - isolated	4.54	0.7
Total hydro (NEA)	**477.53**	**67.7**
Hydro (IPP)	174.53	24.7

[19] NEA Annual Report 2011

Total hydro (Nepal)	**652.06**	**92.4**
Thermal (NEA)	53.41	7.6
Solar (NEA)	0.10	0.0
Total capacity including private and others	**705.57**	**100.0**

48. A Table summarising the installed RET systems (mostly non-NEA) by technology – small, mini, micro and pico hydro power, improved watermills, biogas plants, solar PV, small wind power systems and biomass – is provided in Section 4.

49. **Water and Energy Commission Secretariat (WECS).** WECS was established in 1981 to develop water and energy resources in an integrated and accelerated manner in the country. The primary responsibility of WECS is to assist GoN through related agencies in the formulation of policies and planning of projects in the water resources and energy sectors.

50. **Electricity Tariff Fixation Commission (ETFC).** Set up for the regulation of retail tariffs, ETFC is however now defunct.

51. **Ministry of Environment (MoEnv).** Set up as a separate entity in 2009 following a reorganisation, the main objectives of MoEnv include promotion of sustainable development through environmental protection; conservation and promotion of the natural environment and cultural heritage of the country; creation of a clean and healthy environment through the conservation of life-supporting elements comprising air, water, and soil; poverty alleviation through environment related research activities; and coordination of adaptation and mitigation programs to minimise the negative impacts of climate change.

52. **Alternative Energy Promotion Centre (AEPC).** Established in 1996 by GoN to promote the use of renewable energy and the efficient use of energy, particularly in the rural areas, AEPC is a semi-autonomous government body under the MoEnv. It is governed by a Board comprising nine members representing the government, private sector, non-governmental organisations (NGOs) and financial institutions.

53. The main objectives of AEPC are to develop and promote RETs and energy efficiency to raise the living standard of the people, reduce the negative impacts on the environment due to the use of traditional sources of energy and develop commercially viable alternative energy technologies in the country.

54. AEPC typically works with four types of partners[20]:

- Government agencies: Formulation and promulgation of policies, implementation modality and institutional arrangements, project/program preparation and implementation, fund mobilisation, technical assistance, coordination and networking, monitoring and evaluation, quality assurance, research & development;
- Donors: Funding, technical assistance, monitoring & evaluation;
- Private sector: Prequalification of suppliers of goods and services, promotion and marketing, technological innovations and applications, subsidy administration, provision of loans and insurance; and

[20] AEPC Annual Progress Report, FY 2009-10

- Civil society (NGOs, community based organisations (CBOs) etc): Promotion of RETs and productive uses, development and management of projects.

55. AEPC is presently in a state of transition, soon to become the Alternative Energy Promotion Board (AEPB) with a wider mandate. AEPC was formed under Clause 3 of the Development Board Act 2013 BS, and is currently operating under the mandate given by the Alternative Energy Promotion Development Board Formation Order (Sixth Amendment) 2068. This type of 'development committee' can be formed by government with due notice published in the Gazette. However, AEPB will be set up on a stronger legal footing through an Act approved by Parliament, and not Cabinet. A Bill for the Establishment and Operation of the Alternative Energy Promotion Board is in the pipeline for approval by parliament.

56. It is envisaged that AEPB will be an autonomous body corporate, and in the context of alternate energy it will inter alia have powers to independently raise grant and loan funds locally and internationally; maintain a separate fund (refer Section 6 for a discussion on the Central Renewable Energy Fund (CREF)); provide support to local bodies, NGOs and CBOs; and promote PPPs.

57. AEPC's mandate in the hydropower sector has hitherto been limited to the development of projects up to 1 MW, although in reality its experience has only been in off-grid micro hydro power projects which are off-licence, subsidy-supported and less than 0.1 MW in capacity. Under the AEPB Bill, the threshold has been revised upwards to 5 MW, and it is expected to eventually reach 10 MW. It is thus critically important for AEPB to receive significant organisational strengthening and support in streamlining its linkages with other related agencies if it is to venture into commercially oriented grid-connected SHP projects.

3.3 RET Sector Potential

58. It is estimated that Nepal has about 42,000 MW of commercially exploitable hydro power[21] including over 100 MW of micro hydro power[22]; 2,100 MW of solar power for the grid; and 3,000 MW of wind power. Similarly, another 1.1 million domestic biogas plants can be developed in the country. These assume greater significance in the context of non-availability of fossil fuel and other forms of energy in Nepal.

59. Cumulative results achieved are given in Table 4.1 of Section 4. The latest three-year averages indicate that 81 micro hydropower plants, 46 pico/peltric hydropower plants, 42,085 solar home systems and 18,507 domestic biogas plants are being commissioned annually (see Table 3.2 in Section 3) through existing programs; indicating both the steady progress being made, as well as the vast gap that still needs to be bridged to meet the energy needs of off-grid communities.

3.4 Small Hydro Power

60. **Nepal Electricity Sector Regulatory Framework.** To facilitate development of hydro electricity and attract domestic foreign investment, GoN announced the Hydropower Policy again in 2001.The new policy also amended the royalty payments payable by SHP, with GoN

[21] UNDP estimates

[22] Energy Sector Synopsis Report Nepal 2010, WECS

providing several incentives for SHP development (see **Annex 5**). However, although Nepal has enacted various laws and regulations to attract private investment in hydropower sector, it has not yielded the desired results since the development of the 60 MW Khimti and 36 MW Ghote Koshi plants, which were financed with foreign investment and came online in early 2000.

61. NEA made a commitment in 1998 to purchase all IPP power from projects below 5 MW at a pre-announced standard price. The policy was later amended to include power plants between 1 MW to 10 MW, and then more recently up to 25 MW.

62. The Electricity Act 1992 of Nepal recognised the concept of build-own-operate-transfer (BOOT) in developing hydro projects. Under this concept, the ownership of the project is transferred to the government after the expiry of term of the licence.

63. The term of licence is: (i) Survey Licence: for a maximum period of five (5) years; (ii) Generation, transmission or distribution of electricity up to a maximum period of 50 years[23].

64. The Electricity Act has the following major features.

- Section 3: Prescribes the procedure for issue of licences
- Section 4: Prescribes the timeline for the issuance of licences
- Section 5 read in line with Hydro Policy 2001: Terms of the licence
- Section 6: Restriction on issuance of licence in duplication
- Section 8: Grounds and procedure for cancellation of licence
- Section 10: Transfer of ownership of the Project from developer to Government of Nepal upon expiry of the licence
- Section 11: Royalty to be paid by the licensee
- Section 12: Facilities in relation to income and other taxes
- Section 13: Facilities of foreign exchange for foreign investor
- Section 22: Permitting foreign investment in power export oriented projects
- Section 29: Guarantee that "no nationalisation shall be made of land, building, equipment and structure of the project."

65. **Shortcomings in Legal and Regulatory Framework.** The Electricity Act attempts to make the process of issuance of licences transparent and less burdensome to the applicant, while promoting foreign investment. But according to stakeholders, the poor regulatory environment has added to the sector's problems, particularly in respect of issuance of licence and the decision making process.

The shortcomings in the provision of electricity laws and their implementations are as follows:

- The Electricity Act permits any person or entity to apply for survey licence. This liberal attitude of GoN in implementing the policy has caused problems. Initially very small domestic companies, which did not have the technical expertise and financial

[23] Hydropower Policy prescribes that generation licence for domestic supply shall be for 35 years, and 30 years for export oriented hydro projects. The term of licence for transmission and distribution is 25 years for each

capacity, were granted licences. They are still holding on to these licences despite the fact that they will not be able to build these projects, thus blocking others with the required capacity to access these sites.

- The proposed Nepal Electricity Act of 2065BS and the proposed Nepal Electricity Regulatory Commission Act of 2065 BS for the reorganisation and reform of the sector have been pending approval of parliament for the past two years. Parliament's preoccupation is in drafting a new constitution, while the country experiences a frequent change of government.
- Licences are not being issued within the periods specified in the Electricity Act, namely, 30 days for a survey licence, and 120 days for a generation, transmission or distribution licence.
- The MoEn apparently discourages DoED from issuing licences above 100 MW, thus hindering the development of large hydro projects.
- ETFC has not been able to revise the tariff, and is now defunct. In March 2011 NEA announced a much awaited revision of tariffs for PPAs with SHP developers following representations by IPPs that tariffs were too low and did not provide a fair return[24].
- The negotiation of project development agreements between GoN and developers is an issue. Due to lack of institutional support, lack of clarity on legal aspects, and a lack of capacity in negotiating project development agreements GoN has not invited many hydro developers for negotiations.
- IPPAN reports that the burdensome process of Environmental Impact Assessments (EIA) for small projects makes hydro developers think twice before making investment in energy sector in Nepal.
- There is an inconsistency on the tenor of a production licence: the Electricity Act provides for 50 years, whereas the Hydro Policy suggests only 35 years.

66. **Independent Power Producers (IPP)**. IPPs play an important role in power generation in Nepal. Of NEA's total installed capacity of 705.6 MW, IPPs accounted for 174.5 MW or almost 25% of the total. The installed capacity of these IPPs does not include off-grid micro hydro plants, which may also be owned by IPPs.

67. **SHP Development.** Over the years Nepal has developed some 24 SHP projects (range 1-10 MW) totalling 64.6 MW in capacity. Of this total, IPPs account for 47.3 MW, with individual plants ranging from about 1 MW to 6.2 MW. The rest are NEA owned (**Annex 6** provides a listing of these SHPs).

68. Additionally, IPPs are presently developing 18 SHP projects totalling 77.7 MW, with plant capacities ranging from about 1 MW to 9.9 MW. These projects have all achieved financial closure and are under various stages of completion (see **Annex 6** for list of projects).

69. NEA has also issued power purchase agreements (PPAs) to 29 IPP projects with a total installed capacity of 103.4 MW (see **Annex 6** for list of projects). These projects have not yet reached financial closure with banks to get started. Meanwhile, NEA is considering the

[24] An option to consider is a Standardised Small Power Purchase Agreement and a Standardised Small Power Purchase Tariff for SHP projects [e.g. the World Bank and GEF-assisted Sri Lanka ESD and RERED Projects]

cancellation of PPAs to project developers who are taking an unduly long time to implement their projects. Project developers who have PPAs but have failed to develop the projects have been given 90 days notice to achieve financial closure, failing which the PPA would be revoked along with termination of the generation license. The government can then reissue licenses to new developers on a competitive basis to develop the projects[25].

70. **People's Hydro Power[26].** The proposed People's Hydro Power (PHP) scheme to be launched by DoED aims to assist District Development Councils (DDCs) develop SHP by utilising some of the royalty payments received from SHPs in operation. It is estimated that GoN collects about NPR 1.0 billion p.a. in hydro royalty payments, of which about 50% is given to DDCs. As DDCs do not have the capacity to develop SHPs, DoED will prepare the feasibility studies and develop the projects. After construction, the plant will be transferred to the DDC, and a company will be formed to take over operation and maintenance (O&M). Under the PHP scheme SHP projects will be developed entirely with equity and no debt. People's equity contribution will be at least 10%; with DDCs, FNCCI and cooperatives also likely to participate. The balance will be publicly funded (by GoN), which would initially be treated as a grant, and later converted to equity for the DDC.

Subsidies for PHP projects will depend on the capacity: 75% for those under 1 MW, and 50% for those in the 1-3 MW range. Subsidies for projects in the 3-25 MW range are as yet undecided. The modality is being finalised, but the PPA terms will be the same as for other SHPs.

Under the 5-Year Plan for PHP, 4 projects will be developed in each of the three river basins. These will range from 5-25 MW in capacity, with an average size of about 15 MW. Thus PHP is expected to contribute about 180 MW during the 2011-16 plan period.

71. **Civil Servant Financed SHP.** This is a new proposal to develop about 50 MW of SHP with contributions from civil servants. Details have yet to be determined.

72. **Power Purchase Tariffs for SHP.** NEA purchases power from SHP IPPs at a rate of NPR 7.00/kWh during the dry season, and NPR 4.00/kWh during the wet season, with a 3% price escalation up to 9 years from the commissioning year. As of 23 March 2011, the power purchase terms for SHP was revised as follows:
    - 20% price escalation on the power purchase rate for both dry and wet seasons, i.e., NPR 8.40/kWh for dry season and NPR 4.80/kWh during the wet season; and
    - 3% escalation for 5 years from the date of commercial operations.

3.5 Mini and Micro Renewable Energy

[25] The GoN has announced that projects over 10 MW will be awarded based on competitive bidding. Potential developers can still identify sites and apply for survey licenses on a first come first serve basis for projects up to 10 MW.

[26] GoN, MoEn, DoED Project Document on Implementation Modality of People's Hydropower (for Projects 3 MW to 25 MW), April 2011

73. **Suppliers.** Nepal has a large and vibrant private sector that provides goods and services to the RET sector. They are prequalified by AEPC to ensure quality, while the individual projects or programs that they participate in also specify the required technical standards and service obligations. AEPC has prequalified[27] a total of 57 installation/construction companies for micro/pico hydro power projects and improved water mills (IWM); 52 consulting companies for survey and design of micro hydro projects; 81 biogas companies; 37 solar companies and another 5 companies for quality control; 32 companies for the manufacture of improved cooking stoves; and 13 companies/institutions in the field of wind technology.

74. **Capacity Addition.** Commissioning of micro energy projects supported by AEPC through various projects and programs (discussed later in this Section) over the past decade are summarised in Table 3.2 below[28].

Table 3.2: Micro Energy Capacity Addition

Year of Installation	Number of installations				
	Micro Hydro	Pico/Peltric Hydro	Improved Water Mills	Solar Home Systems	Biogas - Domestic
2000/01	40	112	107	6,211	17,857
2001/02	50	36	58	13,775	15,527
2002/03	34	61	65	18,482	16,340
2003/04	53	80	538	15,106	11,259
2004/05	35	66	599	17,887	17,803
2005/06	38	48	934	6,688	16,118
2006/07	42	46	851	10,806	17,663
2007/08	98	70	1,168	38,375	14,884
2008/09	86	32	1,073	53,662	19,479
2009/10	60	36	986	34,219	21,158

75. **Mini and Micro Energy Financing.** Financial institutions in Nepal consist of commercial banks, development banks, finance companies, micro finance institutions (MFIs), savings and credit co-operatives and non-governmental organisations (NGOs). The first three are licensed by the Nepal Rastra Bank (NRB) - the Central Bank of Nepal, but following the relaxation of licensing requirements of MFIs and financial NGOs, some MFIs are licensed by NRB and others, especially co-operatives, are regulated under the Cooperative Act.

76. Commercial banks account for more than 80% of the assets of the banking sector[29]. The deposits carry interest rates of 8-10% and are typically demand deposits or fixed deposits for a period of one year. The interest spread in 4-5%. Given this scenario banks are reluctant to lend long-term and the lending rates are typically above 14%.

77. Although many commercial banks have lent to RET enterprises, the concept of lending directly to individuals who are end users of micro energy systems is relatively new and

[27] Renewable Energy Data Book 2009, AEPC updated with current statistics from AEPC
[28] Renewable Energy Data Book 2009, Biogas Year Book 2009 and AEPC Annual Progress Report 2009-10.
[29] Nepal Rastra Bank (NRB): Banking and Financial Statistics, No 56, January 2011

untried. Lending to the sector has shown progress under ESAP, which has introduced new financing models and risk mitigation measures as discussed in Section 5. Banks that have shown interest in lending to the micro hydro sector include Himalayan Bank, Nabil Bank, Bank of Kathmandu, Kist Bank, Kumari Bank and Clean Energy Development Bank.

78. Credit delivery and recovery to/from customers in remote areas is a major challenge for commercial banks. Some banks such as Nabil Bank, have built a close relationship with MFIs for their SME portfolio. This is an area that can be scaled up provided there are low cost long-term funds. Other banks such as the Himalayan Bank have followed the Local Financial Institution (LFI) model (see Section 5) adopted under ESAP. The Bank of Kathmanduhas been lending for solar home systems (SHS) for a comparatively long period, mainly through LFIs which act as financial intermediaries between banks and village level consumers.

79. Subsidy support will continue to be required for scaling up mini and micro renewable energy initiatives, which are typically off-grid and target remote rural communities. As noted previously, the important policies and delivery mechanisms are already operational, and the SREP initiative will complement the overall RET development programs that are currently being designed.

80. Interviews with bankers reveal that many banks are convinced that lending to RETs is profitable, while their main concerns hinge on the prevailing high cost and short tenor of funds mobilised, and the modality for the delivery of credit. They have also noted the need for capacity building of bank staff and participating micro credit retailers on RETs and technical support to evaluate project readiness for investment. Outsourcing arrangements for the latter may be a solution. Further, it was mentioned that retailers (Local Financial Institutions) need training and support in social mobilisation work in remote areas[30].

81. Under the Banking Act, banks are required to maintain at least 3% (which will reach up to 5% within the next four years[31]) of their loan portfolio in the 'deprived sector', which includes small and medium industries (SMEs) and RETs. Failure to do so attracts a penalty. Thus, as the banking sector expands so does the potential for additional lending to RETs.

3.6 Ongoing and Planned Investments in Mini and Micro Energy

82. Several donor-assisted programs have been initiated in the past in the energy sector, many with follow-on projects. Projects under implementation are summarised below. They are externally co-funded with a total annual budget of almost NPR 3 billion in subsidy support. It will be noted that many of them will be completed in 2012 or sooner, and development partners are presently designing cooperation programs in consultation with GoN, with SREP adding value to the initiative by being a part of the larger program.

83. The World Bank-funded **Power Development Project (PDP)** which includes a Micro Hydro Village Electrification Program is currently under implementation. PDP also had a component for promoting private sector led small and medium hydropower projects through the Power Development Fund (PDF). However, due to lack of uptake of funds from this component, largely due to the weak institutional set up, the same was restructured and funds were

[30] See Section 5.2 for a discussion on Local Financial Institutions (ESAP)
[31] Monetary Policy 2011, NRB

reallocated to strengthening grid-connected transmission and distribution as well as additional micro hydro projects.

84. The **Energy Sector Assistance Program I (ESAP I)** was originally funded by The Governments of Denmark (through DANIDA), Norway (through NORAD) and Nepal from 1999-2004, and later extended to 2007, for providing subsidy support to the RET sector through a Rural Energy Fund (REF). Disbursements under ESAP I amounted to DKK 166.0 million or 95% of DANIDA, NKK 99.6 million or 100% of NORAD, and NPR 35.5 million or 100% of GoN budgets.

85. Activities supported under ESAP I included the preparation of a national subsidy policy, technical assistance to AEPC, financing of 200,000 improved cooking stoves and 1.8 MW of micro hydro power that benefited 40,000 HH, support for another 69,000 HH through solar home systems (SHS) and the setting up of the solar test laboratory, establishment of the Interim Rural Energy Fund, and support for the Kailali Kanchanpur Rural Electrification Project (KKREP) which involved the extension of the transmission and distribution grid to add around 50,000 new consumers.

86. The follow on **Energy Sector Assistance Program II (ESAP II)** commenced in 2007 and is expected to close in 2012. As before, the governments of Denmark, Norway and Nepal funded the project. In October 2009, the government of Germany through KfW joined ESAP with funds for solar energy. Disbursements as of June 2010 were DKK 95.0 million or 63% of DANIDA, NKK 101.4 million or 81% of NORAD, and NPR 150.5 million or 27% of GoN budgets.

87. With financing through REF, ESAP II had by mid-2010 achieved the electrification of124,000 HH through SHS and another 5,800 through solar lanterns (*tukis*), 25,000 HH through micro hydropower, and supported the sale of 1,800 improved cooking stoves for HH.

88. A **Rural and Renewable Energy Programme (RREP)** is presently being formulated as a follow-on to ESAP. The Rural Energy Fund (REF) set up under ESAP will evolve into the proposed Central Renewable Energy Fund (CREF) as outlined by the Rural Energy Policy 2006.The design and related regulations for CREF arebeing finalised, and it is envisaged that CREF will be a vehicle to mobilise both subsidy and credit funds for the RET sector.

89. The first phase of the **Rural Energy Development Programme (REDP)**, implemented during 1996-2002, was funded by the United Nations Development Programme (UNDP) and GoN. During the second phase 2002-2007, and the third phase 2007-2012 now named **Renewable Energy for Rural Livelihood (RERL)**, the World Bank joined as a financier of the program. REDP's focus has been on micro hydro projects and on livelihood development through RETs. It has also supported SHS on a small scale, typically for HH just outside a micro hydro area and for domestic biogas plants with toilet extensions.

90. REDP/RERL has a delivery mechanism different from ESAP in that it channels funds through the district administration, namely, the District Development Committees (DDCs) and Village Development Committees (VDC). Funds first go into a District Energy Fund at the DDC and then to a Community Energy Fund (CEF) at the community level. The community is empowered to use the CEF to make payments to the supplier. The total budget for RERL

(REDP III) is USD 35 million, of which the donors contribute USD 19 million, GoN USD 4 million and the community USD 11 million. The physical targets include 1.7 MW of community managed mini/micro hydro, 2,200 toilet connected biogas plants, 9,000 improved cooking stoves and 550 SHS in 40 districts.

91. The **Khimti Neighbourhood Development Project (KiND),** a PPP project of GoN, UNDP and Himal Power Ltd that commenced in June 2007 aims to electrify 3,750 HH and provide community infrastructure. It is implemented as a component of REDP, and closes in 2011.

92. The **Renewable Energy Project (REP),** funded by the European Union (EU) and GoN (2004 to 2012) has a budget of EUR 15.6 million, including EUR 15 million from EU. The balance from GoN is an 'in kind' contribution. REP supports the installation of institutional/community solar PV systems in unelectrifed villages for health centres, schools, telecoms, agro-processing etc. REP subsidises the capital expenditure fully by paying direct to the suppliers. These installationsare managed by community organisations or Community Energy Service Providers (CESP) that have received training through REP. The tariff collected by CESP is used to maintain the systems. As of July 2010 a total of 933 systems had been installed in 21 districts with a total capacity of 1.02 MWp against a target of 2.2 MWp

93. The **Biogas Support Program (BSP)** commenced in 1992 with funding from the Government of the Netherlands and technical support from the Netherlands Development Organisation (SNV). KfW also co-funded the program from 1997. SNV acted as the implementing agency until BSP Phase III, and now, under BSP Phase IV (from July 2003), it is under the **Biogas Sector Partnership, Nepal (BSP-N)**. BSP IV is co-funded by Global Partnership on Output Based Aid (GPOBA), GoN, SNV and KfW with BSP-N receiving carbon finance revenue from the World Bank managed Community Development Carbon Fund (CDCF).The budget for BSP IV is EUR 14 million with a target of 117,500 biogas plants, of which 93,000 had been installed as of June 2009[32].

94. Biogas projects under BSP-N are eligible to receive a subsidy and credit via the Biogas Credit Fund (BCF) funded by KfW. BCF has established a credit delivery mechanism through some 163 MFIs in 34 districts[33]and over 4,525 biogas plants have been installed through this Fund.

95. Other programmes under implementation include the **Improved Water Mill Programme** and **Rukum Ujyalo Micro Hydropower Programme**, while the **Climate and Carbon Programme** and **National Biofuel Programme** are still in their infancy.

3.7 Industry Associations

96. The Independent Power Producers Association of Nepal (IPPAN) is a non-profit, non-governmental organisation which was established in 2001 to encourage private sector participation in hydropower development in the country. IPPAN serves as a link between the private sector and government organisations involved in developing hydropower, and helps in

[32] BSP Yearbook 2009
[33] Ibid

the exchange of technology, expertise, knowledge, financial and management information among the IPPs in the country.

97. The mini and micro energy sector is supported by several industry associations that include Nepal Micro Hydro Development Association, Solar Electrical Manufacturers' Association of Nepal, Nepal Biogas Promotion Association, and Biogas Sector Partnership - Nepal (BSP-N).

98. In addition, the Federation of Nepalese Chamber of Commerce and Industries (FNCCI), and Confederation of National Industries (CNI) serve as umbrella organisations with a mandate extending beyond RETs.

3.8 Context of SREP Initiative for Nepal

99. Two main reasons are driving GoN's high priority in promoting the RET sector: (i) compared to extending the national grid, it is less expensive to provide access to modern energy services through RETs for remote and sparsely populated human settlements; and (ii) grid connections and RETs provide cleaner, safer and more convenient energy to people, which also support measures to mitigate greenhouse gas (GHG) emissions and climate change.

100. GoN's goal for the next 20 years is to increase the share of renewable energy from less than 1% to 10% of the total energy supply, and to increase the access to electricity from alternative energy sources from 10% to 30%[34], duly complemented by the current Three Year Plan (2010-2013).

101. By 2020, GoN has a plan to invest USD 1,076 million in renewable energy, of which USD 115 million will be allocated to mini, micro and pico hydro, USD 333 million for solar home systems and USD 135 million for biogas[35]. MoEn is in the process of formulating a 20-year perspective plan for RETs. The finalisation and approval of this document will provide more concrete information about government's plan and financial requirements.

102. The SREP initiative will complement the overall RET development program from 2012. Donors are in the process of designing cooperation programs in consultation with GoN, and SREP will add value to the initiative by being a part of the larger program. The RET sector is typically financed through a combination of subsidy, loan and equity. GoN through AEPC provides the subsidy with donor support. However, financial intermediaries use their own funds for credit delivery, with the exception for biogas projects which have access to a credit fund. SREP will support SHP and mini/micro energy initiatives, with the latter focusing on mini/micro hydropower, solar PV and biogas. All these components will involve investment as well as related capacity development interventions as appropriate, including capacity building of local government (DEEUs under DDC) for supporting the decentralisation of RET programs in Nepal[36].

[34] Presentation by AEPC on Scaling-up Renewable Energy Program in Nepal, 6 Feb 2011
[35] Report of the Task Force for Generating 10 MW Hydropower in Ten Years, MoEn, 2009
[36] Aide Memoire, SREP: First Joint Programming Mission to Nepal, 4-11 July 2011

4.0 SELECTION OF RET SUB-SECTORS FOR SREP INVESTMENT

4.1 Renewable Energy Technology Options

103. Renewable energy technologies (RET) have been promoted in Nepal since the early seventies. However, intensive promotional packages through donor supported projects and programs were designed and implemented about two decades later, duly supported by subsidy policies and other incentive packages.

104. The cumulative results, measured in terms of number of installations and capacity are summarised in Table 4.1 below[37].

Table 4.1: Summary of Installed RET Systems

RET	No.	Capacity	No. of Districts
Hydro power			
Small hydro[38]	26	76.72 MW	
Mini hydro	40	14.95 MW	31
Micro hydro	864	14.75 MW	59
Pico hydro	1,262	2.45 MW	53
Improved water mill	7,686	-	46
Biogas			
Household	238,587	-	72
Community	61	-	20
Institutional	111	-	25
Solar PV			
Household	227,039	6.31 MWp	74
Institutional	259	-	42
Water pumping	79	-	26
Wind			
Off-grid	26	8.6 kW	11
Biomass			
Improved cooking stoves	560,167	-	48

4.2 Selection of Projects for SREP Financing

105. Considering the amount of funding available under SREP and the need to focus, only selected RETs have been considered for assistance under SREP. In turn, they have been evaluated in the Table 4.2 below against the impact they would have in terms of the SREP eligibility criteria. The evaluation, measured as 'High', 'Medium' or 'Low' impact, reflects general industry knowledge and past experience.

[37] Renewable Energy Data Book 2009, AEPC with updated statistics where available, and other sources

[38] NEA, DoED and IPPAN, as of mid 2010

Table 4.2: Selection Criteria and Shortlisting of Projects

Criteria	Small Hydro Power	Mini Hydro Power	Micro Hydro Power	Pico Hydro Power	Improved Water Mill	Solar PV	Biogas
Leverage							
Additional credit funds	High	High	High	Low	Low	High	High
Additional grant funds	Low	High	High	Medium	Medium	High	High
Transformational Impact							
Potential for scaling up	High	Medium	High	Medium	Medium	High	High
Potential for innovation	Medium	Medium	Medium	Low	Low	Medium	Medium
Poverty reduction	Medium	High	Medium	Low	Medium	Low	Medium
Gender/social inclusiveness	Medium	Medium	High	Low	Medium	Medium	Medium
Climate change mitigation	High	Medium	Medium	Low	Low	Low	Medium
Sustainable Operations							
Project readiness	High	Medium	High	Medium	Medium	High	High
Cost effectiveness	Medium	Medium	Medium	Low	Medium	Low	Medium
Fit with national priorities	High	High	High	High	High	High	High
Overall impact	High	High	High	Medium-Low	Medium	High-Medium	High

106. Based on the above results, it is proposed that small, mini and micro hydro power, solar PV and biogas technology based projects be supported under the SREP-IP as they appear to have the highest overall impact. The others will be assisted under other projects and programs.

4.3 Barriers that Impact Sustainability and Scaling Up

107. **Small Hydro Power Sector.** Consultations with stakeholders indicate several barriers that impede the growth of the SHP sector in Nepal. **Annex 7** summarises discussions with stakeholders. The legal, policy, regulatory, institutional, financial, technical, and environmental barriers to SHP development, their impacts, and potential measure to mitigate barriers are provided in Table 4.3 below. Some of the principal barriers include: (i) lack of clear and supportive policies and regulatory framework; (ii) limitations on bank financing: unattractive loan duration and interest as banks are unable to raise long-term borrowings; inability to hedge the exchange risk, as lending is in USD but the income stream is in NPR; (iii) ineffective licensing procedures; (iv) no single agency fully empowered to serve the SHP sector; (v) poor or no access infrastructure or power evacuation lines; (vi) burdensome environmental impact assessment; (vi) additional financial burden on NEA during certain periods of the year resulting from underutilisation of its own power plants while being forced to absorb power from SHPs due to take-or-pay PPAs; (vii) non-availability of equity and mezzanine financing for project developers; (viii) legal enforcement authorities and contracts; (ix) low load factors of SHPs and their inability to deliver energy during the periods of power shortages; and (x) suboptimal exploitation of hydropower sites due to ad hoc development resulting from the absence of integrated river basin plans. Financing for SHP poses one of the most critical risk for development and scale-up of SHP in Nepal. **Annex 8** elaborates on some of the specific financing risks faced by SHP projects.

108. **SHP Financing. C**ommercial and development banks have indicated a strong interest in participating in an SREP-based approach for SHP financing. However, their primary concern is in relation to access to long-term financing and high interest rates that continue to be a major impediment to loan growth to the hydropower sector. Furthermore, numerous banks are struggling to meet their capital and cash reserve requirements, and are thus curtailing their lending, particularly those of long tenors as required by SHPs.

109. Banks reportedly have a large pipeline of SHP projects. However, some projects have developers who may not have the capacity to execute or have weak or no contracts with other service providers in the project development supply chain. Some projects are impeded by other barriers such as lack of transmission access. Hence, the actual number of projects which the banks may consider creditworthy could be much lower. This warrants a closer look at the projects in order to resolve these barriers, including the basis on which licences are issued. On the other hand, one may also want to review the underwriting guidelines of these banks, as they would typically be using traditional collateral based lending as opposed to structuring innovative project financing mechanisms[39]. It will be noted that many commercial banks now also have development banking units, and hence, this presents an opportunity for training and capacity building of promising financial institutions on SHP project financing through the TA window of SREP.

Issues relating to financing SHP projects in Nepal are discussed more comprehensively in Sections 5 and 6.

110. **Mini and Micro Hydro Power Sector.** In common with many RETs, the main barriers are the high front end cost and financing. The former is largely addressed through targeted output based capital subsidies. However, suppliers have expressed concerns on the unreliability of timely subsidy payments, which then adds to their financing costs.

111. Community based micro hydro projects are funded through member equity in cash or kind ('sweat equity'), subsidy support and loans from MFIs. However, access to term loans, particularly for the larger mini hydro projects, has become limiting factor for scaling up.

112. The long lead time for setting up micro hydro projects is a barrier for developers, as it ties up working capital and payments are staggered over a long period.

113. Low load factors arising from the limit of 120 W/HH that effectively prevents productive end use, and financial/management capability of CBOs to handle unexpected breakdowns and migration of skilled members are issues faced by some micro hydro projects.

114. Slow take off of mini hydropower projects, largely due to the fact that while the capacity tends to be too large for a small community of dispersed HH, it is not large enough to be economically connected to the grid.

[39] Simple mechanisms such as insulating energy sale revenue streams through Escrow Accounts, legal provision for taking over the management of the project company as a going concern in the event of default etc. [Sri Lanka: World Bank and GEF-assisted ESD and RERED Projects]

115. Technical assistance is also required for several stakeholder groups for scaling up, such as basic training for financial institutions on RETs and financing mechanisms; and design courses for manufacturers of mini hydro equipment, including low head applications.

116. **Solar PV and Biogas.** Although these RETs have evolved and have relatively well developed business models in Nepal, financing the capital cost continues to be a major barrier. This is being largely addressed through output based capital subsidies. However, suppliers have noted that the release of subsidy funds are sometimes delayed, leading to uncertainty and additional costs of doing business.

117. Transactions costs are high as end users are typically individual HH living in remote and dispersed locations, and thus finding MFIs willing and able to serve this market segment is a challenge. The AEPC credit delivery model #3 is one solution for solar PV, while alternative business models may also be considered here, as discussed in Section 5.

118. Biogas for domestic applications already has a credit delivery mechanism in place (see Section 5). However, there are challenges to scaling up community biogas projects as many have failed in the past, mainly due to a perceived sense of inequity between members as the benefit one gets has no direct bearing on the quantity of feedstock (and hence effort) provided. Nevertheless, there exists a good potential for institutional biogas plants that could be set up in places such as schools, military barracks and hotels. However, this will require training and capacity building for manufacturers and installers.

119. The table below summarises the key barriers and possible mitigation measures for the shortlisted RET subsectors for SREP support.

Table 4.3: Summary of Barrier Analysis

Barrier	RET	Cause/Impact	Potential Mitigation Measures
Financial			
High capital cost	All	Remoteness of sites, difficult terrain and poor infrastructure for access and power evacuation	Tariff and subsidies to be adjusted accordingly
	SHP	High cost of transmission right of way	GoN to assist IPPs with transmission access/land acquisition
	Solar PV	Inherent in current state of development of PV technology and balance of system components	Seek cheaper sources of supply, particularly technically certified 'plug and play' systems
Lack of risk insurance	SHP	IPPs are unwilling to purchase insurance to mitigate risks	Consider developing appropriate low cost risk insurance instruments
High transaction costs on a per kW basis, both upfront and operational	All	Due to the inherent characteristics of RE projects - small size, remote locations, dispersed off-grid HH	Bundling of projects where feasible to reap economies of scale
Perceived low power purchase price	SHP	IPPs regard the power purchase tariff as being too low	Conduct an independent study to review not only the power purchase price but also the NEA tariff that has not been revised since 2001
Willingness to pay	Mini and micro hydro, solar PV	More expensive than grid supply for an equivalent level of service	Subsidies; income generating activities from end use

Delays in subsidy payments to suppliers	All (not applicable for SHP)	Administrative delays in release of funds	Improved internal operations and coordination
Lack of access to project financing from banks	SHP and mini hydros	Constraints in long-term fund mobilisation by banks; liquidity crunch; inadequate capacity to evaluate and structure project financing (reliance on collateral based lending)	Access to long-term and cheaper sources of funds by banks; training and capacity building on RETs and innovative project financing mechanisms including hedging against forex risks of IPPs
Technical			
Weak transmission capacity	SHP	Lack of transmission capacity near SHP sites	DoED licensing process to be matched with NEA transmission expansion plans; More financing required to expand transmission grid
Low load factors	SHP	Low output during dry season when power demand is high	Consider reservoir based projects
Weak after sales service	Micro hydro, solar PV	Remoteness of site, weak consumer protection/awareness of rights and enforceability	Consumer education; tripartite agreement between supplier, lender and end user
Institutional structure/Capacity			
Weak Project Development Agreement (PDA)	SHP	DoED does not sign the PDA with developer, exposing the latter to risks associated with change in laws	Draft a standardised PDA, and DoED should be a signatory
DoED's conflict of interest	SHP	DoED as regulator should not be developing projects (e.g., PHP) and compete with IPPs	NEA or another agency should be established to develop GoN projects
Off-taker issues	SHP	(i) NEA is the only off-taker, and is not required to buy all IPP power if it refuses to sign PPA for wet season; (ii) NEA's creditworthiness is questionable, leading to higher financing costs to IPPs	(i) Consider open access markets which will allow IPPs direct domestic sales; power wheeling mechanism and greater access to export markets will also help; (ii) Consider sovereign guarantee
No credible EPC contractors	SHP	Lack of capacity in the country	Consider multiple EPC contracts segregated by type of service, instead of a single EPC contract
Weak capacity of developers	SHP	Insufficient training and development	Capacity building on project development and bank due diligence process
Low awareness of opportunities and economic benefits	Mini and micro hydro, solar PV	Insufficient social preparation and awareness creation by developers and others	Awareness creation
Limited design capacity of manufacturers/ installers	Mini and micro hydro, large biogas	Lack of design experience in (i) grid interconnection for mini/national grids, (ii) large institutional biogas plants	Training programs
Limited capacity of suppliers to provide quality assurance	Mini and micro hydro	Lack of testing facilities	Introduce national standards; set up testing facility and certification
Weak capacity of end user for O&M	Mini and micro hydro, solar PV	Weak user training and follow up; capacity limitation of end users exacerbated by migration of trained manpower	Consider technical partnerships with nearby workshops/repair facilities not necessarily from the beneficiary group
Legal/policy/ regulatory			
Political instability	SHP and others	Policies can change overnight with an unstable government	Enact laws and publish policies to reduce developer anxiety

Multiple/conflicting laws	SHP	Multiple government agencies to deal with, sometimes with conflicting rules and regulations	Streamline policies and laws; single agency to deal with project developers
Lack of policies on land acquisition	SHP	Costly land acquisition	GoN to develop policy on land acquisition
VAT	SHP	Considered too high by IPPs	Evaluate impact and consider zero rating for qualifying projects
Loopholes in the licensing process	SHP	Companies without the required capacity holding on to licenses that were issues on a first come - first served basis	Licences to have a time bar for project completion; consider changing the system to competitive bidding

5.0 PROGRAM DESCRIPTION AND ROADMAP

5.1 Small Hydro Power

120. **Roadmap for the Development of SHP.** The Three Year Plan for the period 2010/11 to 2012/13 identifies major development interventions, including the framework for development of the hydropower sector. In the long-term, the plan envisions using the country's water resources to meet domestic electricity demand and increase foreign exchange earnings from the export of surplus power. The targets set for the sector in the long-term, up to 2027, are:

- Generating 4,000 MW of power by 2027 to meet domestic demand;
- Expanding electricity services to cover 75% of the population through the national grid, 20% of the population through isolated small and micro hydropower systems, and 5% of the population through alternative energy sources; and
- Increasing annual per capita electricity consumption to 400 kWh from the 71 kWh in 2006.

121. The key strategies to be adopted by government to achieve these targets are:

- Improving regulation of businesses involved in electricity generation, transmission, and distribution;
- Encouraging investments in hydropower by adopting a one-stop-shop approach so that investors can obtain all approvals from a single agency; and
- Expanding the capacity of electricity generation. It is also acknowledged that attracting private investments in hydropower will be vital to satisfying the large investment needs of the energy sector.

122. The principal elements of the Roadmap for development of SHP are the following:

- Formulate and establish an enabling framework of laws, policies and regulations that alleviate the barriers to SHP and mitigate associated risks identified in this assessment;
- Develop an institutional framework that supports the development of SHP by the private and public sectors;
- Establish an institution/agency empowered with the authority and responsibilities necessary to serve as a single-stop window for SHP development by the public and private sector;

- Develop a financing framework and mechanism, including risk mitigation instruments, that address the concerns and needs of IPPs, public sector developers, and commercial banks;
- Establish an electricity market structure for domestic use and exports that encourages development of SHP and provides a reasonable return to investors; and
- Build capacity of public and private sector agencies, government agencies, the electric utility and commercials banks to implement policies and develop SHP.

123. Each element of the Roadmap described above encompasses several actions to be taken by various agencies. The technical assistance for developing the SREP Investment Plan will identify the activities to be completed providing GoN with a well-defined Roadmap for the sustainable development of the SHP sector.

124. **Business Models for SHP Project Financing.** Local commercial banks in Nepal and IPPAN members are generally in agreement that direct subsidies are neither required nor advisable for development of SHP projects. The prevailing view among stakeholders is that long-term sustainability of SHP requires developing robust market implementation mechanisms that will favour sound investment projects, which in turn will attract generation licences and capital. This will allow debt finance providers to adopt suitable underwriting practices and expand the available financing to individual projects. Commercial banks have indicated their preference for SHP project survey licences and project development to be driven by a competitive bidding process. Indeed, a competitive bidding process for SHP licensing would be more supportive of GoN efforts for sustainable development of the SHP sector. There are several areas in which the GoN can provide support to SHP development while fostering a market-driven approach including but not limited to the following options.

125. **Structured Subsidy Program**. An indirect subsidy sized based on the direct development costs incurred by SHP developers could be provided, conditional to achieving financial closure and commencement of operations. Since the direct development costs are typically sunk costs (unless financed), such subsidies could be required to be utilised to support debt repayment or interest cost relief rather than simply providing a return of capital to the developers ahead of the debt providers.

126. **Project Risk Support for Lenders**. GoN financial support in the form of indemnities, guaranties, or contingent financing could be employed to cover financing contingencies related to project risks related to obtaining construction and environmental permits, Rights of Way for penstock and power transmission, water access, and enforcement of agreements with local communities and compliance with local ordinances.

127. **NEA Credit Support**. An explicit GoN guarantee of one or both of (i) the timely (rather than ultimate) payments by the NEA under the SHP Standard PPA, or (ii) a termination payment to cover debt repayment in the case of a termination of the PPA due to an NEA default.

128. **Foreign Exchange Risk Support**. The typical SHP project has material "external costs" comprising equipment and contracting services. The project development timetable is short relative to any permanent financing, but, however, is still measured in years and therefore presents significant exchange rate risks, especially given Nepal's current economic

circumstances vis-à-vis its pegged exchange rate regime, which would need to be hedged. Such support could also hedge against risks associated with foreign hard currency financing.

129. The proposed business models for financing SHP through SREP support is discussed in greater detail in Section 6 of this Investment Plan.

130. **Pipeline of SHP Investment Opportunities.** Several potential SHP projects in the range of 1-10 MW have been identified for investment. These include projects in the public and private sectors as described below.

Private Sector SHP Projects

According to the DoED licensing database, there are more than 450 SHP developers with Survey Licence applications still pending or reserved, representing approximately 2,400 MW in potential SHP projects. If all granted SHP Survey Licences are included, there will be about 635 SHP developers representing over 3,300 MW in SHP projects. Given that many of these projects may never materialise, it is more practical to consider SHP projects that have executed Standard PPA contracts with the NEA but have not yet achieved financial closure. A total of 27 such projects with an aggregate capacity of 102.3 MW are viable investment opportunities (see Table in **Annex 6**)

Public Sector SHP Projects

People's Hydropower Project (PHP): As discussed previously (Section 3.4) the PHP scheme is expected to develop 12 projects totalling 180 MW during the period 2011-16. PHP projects in the 1-10 MW range may be eligible for SREP support.

Civil Servant Financed SHP: There is a proposal to develop about 50 MW of SHP with contributions[40] from civil servants. The implementation modalities for this scheme have not yet been finalised. Projects in the 1-10 MW range to be developed under this scheme may be eligible for SREP support.

131. **Financing SHP Investment Opportunities.** Based on an average SHP development cost of approximately USD 2,250 per kW in Nepal, financing a potential SHP investment pipeline of some 100 MW (which represents projects with PPA's that require financing) would require approximately USD 225 million. Based on prevalent financing terms in Nepal for SHP, the subordinated (e.g., equity) component of the capital sources is approximately 30%, indicating that the debt financing required for the representative SHP pipeline is some USD 160 million (NPR 11 billion). Assuming that an additional 15% financing (in the form of mezzanine or preferred shares) is required by the developers to meet lenders' 30% equity requirements, the total financing requirement for the representative SHP pipeline is about USD 200 million (NPR 13.5 billion). *While the potential pipeline for SHP is about 100 MW, SREP funds allocated to SHP would only support the development of about 50 MW.*

[40] Financed by the Provident Fund of employees

132. **Financing Capacity of Financial Institutions**. The size and structure of Nepal's financial sector indicates that, subject to adequately mitigating the various barriers to financing SHP projects, some local funding sources are available to leverage the SREP funds to meet the financing requirements of the representative SHP investment pipeline and allow SREP to have the required transformative impact. For instance the Pension and Insurance Sectors in Nepal invest mostly in GoN instruments and in shorter-term bank deposits, and have therefore not entered the credit markets. But these sectors could potentially participate in any SREP initiative by mobilising funds to support longer term financing to the banking sector. The commercial bank sector in Nepal is potentially another source of credit. The aggregate domestic credit provided by the commercial bank sector is substantial relative to Nepal's SHP financing needs, but so far the actual credit availability and extensions to SHP from the commercial bank market has been limited. This is because commercial banks source their funding primarily from short term deposits, and so for risk management and commercial reasons, prefer to provide shorter term facilities with one to three year durations to industrial and commercial enterprises with high turnover and short term receivables as collateral, rather than to the SHP sector which need longer term loan structures. A description of the capacity of local banks to finance SHP projects is provided in **Annex 9**.

5.2 Business Models for Mini and Micro Energy Initiatives

133. **Approach.** As SREP will be part of a larger RET development program of GoN, investments for mini and micro energy initiatives under SREP will build on the business models and supporting institutional arrangements that have worked well so far (refer Section 3) and harmonised with the guidelines of the participating projects or programs. Funding from SREP for mini and micro energy initiatives will be channelled through two windows of a Central Renewable Energy Fund (CREF), one for subsidies and technical assistance, and the other for credit financing through a revolving fund.

134. **Subsidy Delivery.** The subsidy delivery mechanism is laid out in the Renewable (Rural) Energy Subsidy Delivery Mechanism, 2010 of GoN. This document formalises the arrangement which has been in operation for many years and states that the Rural Energy Fund (REF) will be the vehicle to channel subsidies. While alternative subsidy delivery routes prevail in some projects, plans are afoot to streamline all delivery through the REF, which in turn is being restructured to become the CREF (as discussed in Section 6).

135. **Credit Delivery.** An approach that will continue under SREP as well is the ESAP credit delivery model for RETs. This has three delivery options:

- In the first credit delivery model the partner banks (eleven in total of which six are presently active[41]) lend directly to the end user. Typically the interest rate is about 14% p.a., and the maximum tenor is seven years. Collateral is a mixture of personal guarantees, project assets, deposits etc.
- In the second model banks lend direct to the end user but via an agent who acts on behalf of the bank to do the necessary paperwork, and sometimes even collect the loan instalments. The agent is known as a Local Financial Institution (LFI) and is generally a co-operative. Under Nepali law, co-operatives are independent legal

[41] Himalayan Bank, Nabil Bank, Bank of Kathmandu, Kist Bank, Kumari Bank and Clean Energy Development Bank

entities and their bye-laws allow them to borrow from financial institutions. As in the first model, the credit risk in borne entirely by the banks. The LFI receives a one-time service charge of approximately 1-2% of the loan amount.

- Under the third credit delivery model, the LFI acts as a retail bank and takes on the credit risk. It borrows wholesale from the partner banks and lends retail to the users with a mark up. The final interest cost to the end user is about 18-20% p.a. (cooperatives generally are allowed to have a maximum spread of 6%); while the tenor is 1-3 years. Given the characteristics, this model is more appropriate for financing solar home systems and lanterns.

136. In contrast, REDP has a delivery mechanism different from ESAP in that it channels subsidy funds through the district administration, namely, the District Development Committees (DDCs) and Village Development Committees (VDC). Funds first go into a District Energy Fund at the DDC and then to a Community Energy Fund at the community level. The community is empowered to operate this Fund to make payments to the supplier.

137. The capital expenditure for the installation of solar PV systems in public facilities may be fully grant funded (as in REP), with installations being managed by community organisations that collect the tariff to maintain the systems.

138. An important feature of SREP funding will be the access to long-term low cost credit financing for banks through the CREF. This will address a major barrier in scaling up investments in the energy sector, as at present financial institutions do not have access to long-term external funding or refinance for on-lending, and rely on short-term deposit taking to fund their credit programs. Other than for biogas (see below), the focus has so far been only on subsidy support and technical assistance.

139. **Credit Funds.** The Biogas Credit Fund (BCF) is financed by KfW and operated through AEPC. It is a revolving fund with credit delivery through MFIs, many of which are cooperatives. The AEPC lends to MFIs at 6% p.a. interest rate, which is then on-lent to consumers at an interest rate not exceeding 14% p.a. Of the 6% charged by AEPC, 2% goes back to the Fund, 1% to MoF and 3% used as management expenses of BCF. AEPC monitors participating MFIs who are required to finance at least 10% of their loan amount with matching funds. Security to be provided by the MFIs is also regulated. The average cost of a domestic plant is NPR 50,000 and the maximum disbursement per plant is NPR 25,000.Credit recovery under BCF has been reported to be good and this business model will be continued under SREP.

140. A Micro Hydro Debt Fund is presently being set up by AEPC with funding from GIZ (German development agency, formerly known as GTZ) amounting to EUR 500,000. These funds will be channelled for mini/micro hydro power development through two commercial banks. Although the amount is relatively small, this initiative holds promise for further scaling up to address the paucity of long-term loans for the larger projects.

141. Likewise, the CREF that is under preparation is expected to have a debt revolving fund for credit delivery for mini and micro renewable energy projects.

142. **Credit Enhancement Measures.** ESAP's main contribution to the development of RETs has been through innovative mechanisms that address some of the barriers to credit delivery. They are summarised below and may be replicated with suitable adaptation under SREP:

- Intermediaries (LFIs) to bridge the gap between small rural borrowers and banks, particularly where MFIs are not available in the vicinity.
- Insurance against accidental and natural disaster cover, operated through insurance companies with the premium paid by the Project.
- Partial credit guarantee, as presently operated through the Deposit and Credit Guarantee Corporation (DCGC), a government-owned entity. DCGC guarantees 75% of the outstanding loan balances and charges ESAP a premium of 2-3% on the RET portfolio balance. Although banks have not yet called on the credit guarantee for the RET sector, the procedures for recovery are generally considered lengthy and time consuming. Furthermore, there is a cap of NPR 3 million for each loan that is guaranteed. The continuity of credit guarantee scheme is under consideration[42].

143. **Mini and Micro Hydro Project Developers.** Prequalified project developers are selected by the community based on a shortlist provided by AEPC. They are paid from grant funds at REF for detailed feasibility studies, the amount being based on the plant capacity, with an added premium for districts deemed to be very remote. It ranges from NPR 60,000-70,000 for 5-25 kW to NPR 280,000-300,000 for 101-1,000 kW. Payment is made after review by the District Energy and Environment Unit (DEEU) or Regional Renewable Energy Service Centre (50%), followed by the Technical Review Committee of AEPC (50%).

144. Subsidy support for the cost of the plant is also staggered, based on predetermined milestones and verifications. Payments are released to the project developer and manufacturer/installer as appropriate.

145. **Solar PV Suppliers/Dealers.** Consumers select their supplier independently. Subsidies are available only in respect of suppliers prequalified by AEPC, and disbursements are made on prescribed procedures as per the Subsidy Delivery Mechanism.

146. **Biogas.** The business model is well developed, and consumers select their supplier independently. Subsidies are disbursed based on procedures specified in the Subsidy Delivery Mechanism administered by AEPC. As discussed previously, the BSP is now in its fourth phase, with BSP-N taking over the responsibility for implementation.

147. **Outlook.** Overall, financial institutions have a positive perception of mini and micro RET investments and the measures available for risk mitigation. They have not attached an additional risk premium in terms of higher rates of interest to the sector. Nevertheless, banks have expressed a need for greater access to long-term funds to refinance their lending to the sector and for further capacity development of their own staff and those of LFIs.

148. As previously noted, investments for mini and micro energy initiatives under SREP will strengthen any of the above models that have proved to be successful in the past, or variations

[42] The partial credit guarantee facility of the WB -GEF Philippines Rural Power Project was a failure, and discontinued in 2010. A more customised, privately funded credit risk mitigation mechanism set up independently by an MFI (SEEDS, Sri Lanka) under the WB-GEF Sri Lanka Energy Services Delivery Project (1997-2002) and continued under the follow-on Renewable Energy for Rural Economic Development Project was more successful.

thereof. Alternative business models that could further mainstream these technologies may also be considered, which include competitive procurement and geographic concessions:

- Bundling of micro hydro projects and bidding out to pre-qualified developers, thus minimising costs through economies of scale and achieving faster project completion times. However, this has to be weighed against possible complications in the procurement process, particularly in drafting terms and conditions with incomplete and imprecise site data and the possible marginalisation of 'small' developers who may find the bid packages too large to handle.
- A similar bundling approach for solar PV may be considered, but with the added feature of including PV installations in public facilities such as schools, health clinics, street lights etc. This approach (known as Sustainable Solar Market Packages) was pioneered in the Philippines[43], where the winning bidder of a lot or package comprising a cluster of neighbouring villages is paid to install solar PV systems in identified public facilities, while being contractually obligated to market a minimum number of SHS to un-electrified HH in the same villages within a specified timeframe. The underlying objective is to cover the fixed costs of doing business in a remote or difficult territory in the bid price for PV installations in public facilities, thereby minimising the cost of SHS sold to HH as only the variable costs need to be considered in their pricing.
- Use of a fee for service model for HH to access electricity services through SHS. The tariff paid by the HH is pegged to an equivalent level of service from the grid. As the levelised cost of PV services is higher than the typical lifeline tariff applicable to such small consumers, the difference is paid (usually computed as an equivalent capital subsidy) to the service provider. Typical service providers would be distribution utilities or electric cooperatives, but may include others such as solar PV companies, NGOs etc.

5.3 Technical Assistance and Capacity Building

149. The proposed transformation of AEPC into AEPD (with its mandate extending to SHPs of up to 10MW) will require institutional restructuring of AEPC through appropriate legislation and policy reforms, including the ongoing Strategic and Organisational Development initiatives. Further, the design, development and setting up of the CREF together with the required operational and governance structures will require external advisory assistance. All these activities will be supported through SREP technical assistance where appropriate.

150. Likewise, SREP technical assistance will be deployed for training and capacity building of other stakeholders, which will include:

- Developing the capacity of banks to structure innovative project financing mechanisms particularly for small and mini hydro power projects, as distinct from the present traditional collateral based lending
- Conducting familiarisation programs for banks and LFIs on RETs
- Training on credit delivery models (including rapid rural appraisal techniques, social preparation/mobilisation, credit evaluation and structuring, book keeping and accounting) to establish and develop LFIs. LFIs serve as intermediaries between

[43] World Bank and GEF-assisted Philippines Rural Power Project

banks and end users in the ESAP credit delivery models, that will continue under RREP/SREP

- Upgrading the design capabilities of manufacturers of (i) small and mini hydro power plant and equipment, particularly on low head applications, and (ii) large institutional biogas plants
- Developing the capacity of local government units such as DEEUs under DDCs for supporting decentralised renewable energy development.

151. SREP technical assistance will also be used for overcoming other barriers through appropriate interventions. These may include support for studies, surveys, development of business models, development of technical standards and specifications, testing facilities, policy development and the like.

5.4 Co-benefits

152. The potential development of about 50 MW of SHP with SREP support will significantly add to the total installed capacity in the country, and have significant economic and social impacts. One of the key benefits of developing SHP projects is potentially making power available to parts of the country not previously electrified. This however will require investments in the transmission system. Another benefit of SREP support for SHP development will be the associated capacity building and strengthening of the capabilities of IPPs and EPC contractors in Nepal to develop SHP projects and local commercial banks to finance them. However the pathway for development of SHP projects should consider and address the issues and constraints faced by NEA in incorporating non-firm power into the grid system.

153. Under SREP an estimated 750,000 HH and small enterprises will gain access to electricity services through off-grid mini and micro hydro projects and stand alone solar PV systems. Apart from the direct benefit of having a convenient source of illumination, there are numerous social and environmental co-benefits such as: smoke-free and healthier indoor air; safety (kerosene bottle lamps often topple, leading to fires); security (through street lights, electric fences to protect crop etc.); extended hours for domestic work or children's study; prospects for day time productive use; access to information and entertainment (through radio, TV, mobile phones, internet etc); and the mitigation of GHG emissions by displacing kerosene lamps and candles.

154. An estimated 140,000 domestic and another 10,000 institutional biogas plants are planned under SREP. Biogas provides a clean and convenient source of heat for cooking and saves the drudgery of gathering fuel wood, a task typically assigned to women. In addition, the environmental co-benefits include the mitigation of deforestation, and the productive use of the slurry, a by-product, as an organic fertilizer.

155. All of the above, that support GoN's policy on renewable energy development, directly contribute to the country's energy security.

156. Further, several economic, environmental, social and gender co-benefits are triggered on many fronts that are not always immediately quantifiable. They include aspects such as the

impact of improved access to information and empowerment of local communities, particularly women; and the socio-economic development of the community through opportunities for entrepreneurship that are unleashed by access to modern energy services.

6.0 FINANCING PLAN AND INSTRUMENTS

6.1 Small Hydro Power Fund

157. The objectives of the SREP with respect to SHP financing modes, are to:
(i) Reduce barriers to financing SHP projects,
(ii) Scale-up SHP by leveraging SREP investments with funds from the private and public sectors, and
(iii) Have a transformational impact in the local financial markets for SHP.

158. The financial market structure and dynamics in Nepal impose additional constraints on the practicability of SHP financing alternatives with SREP funds. Currently, Nepalese banks stretch their liquidity and underwriting criteria to finance SHP projects and are subjected to financing and credit risks that can lead to bank stress. Nepal does not have a sufficiently developed capital market to absorb the demand for the long-term financing needed for development of SHP. A solution for scaling-up SHP financing with SREP funds would combine the strengths and comparative advantages of local and international capital providers to structure a platform for private capital and public/donor capital to work in partnership. SREP could be used to scale up SHP development through several different financing mechanisms, some of which are briefly discussed below along with the recommended mechanism.

159. **SHP Developer or Project Equity/Mezzanine Level**. SREP funds may be utilised to provide equity or mezzanine capital to eligible SHP developers. Co-investing with or providing mezzanine capital to SHP projects would mitigate a significant financial barrier to scaling up of SHP, and assist developers raise debt capital from credit institutions. The investment could be structured as an equity/mezzanine fund managed by a professional fund manager, and the investment can vary from common equity in the SHP developers to co-investing directly into the SHP project either as equity or mezzanine debt and either on a funded or contingent basis.

160. **Project Senior Debt Level**. SREP funds may be used to co-invest with Credit Institutions in the senior debt of the SHP Projects directly addressing an important financial barrier. Currently, the banking sector is constrained by the size of individual credit exposures each can take on a specific SHP borrower, resulting in high participation rates within bank syndicates in order to fund SHP projects. The fund investment may be as a syndicate member or in contingent form by providing credit guarantees. The structured fund could also provide capital relief to the credit intermediaries to avoid single obligor exposure limits by having the fund absorb a senior portion of the risk of ultimate loss in each SHP project financing.

161. **Take-Out Financing at Project Senior Debt Level**. Typically, the construction stage of an infrastructure project is relatively short and entails a significant degree of project risk including such risks as permitting, procurement, engineering and design, construction quality and budgeting, and the operating efficiency of the resulting installation. After construction, the project can seek long term financing based on the predictability of the cash-flow

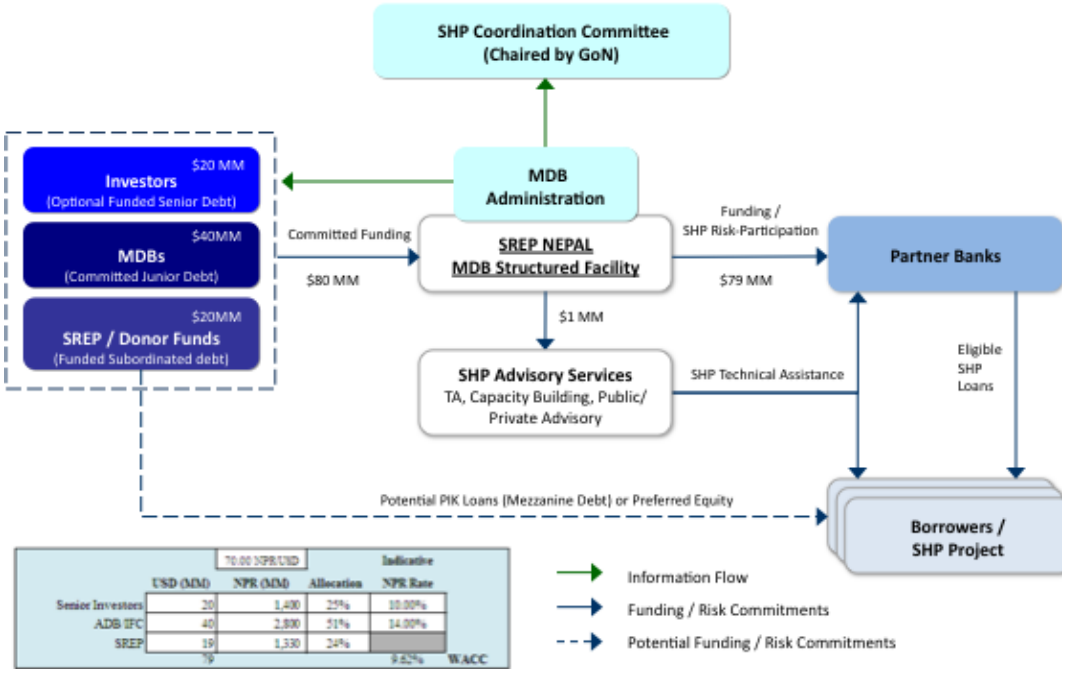
generation and the operating efficiency of the assets. Such long term financing will allow a debt capacity which is higher than the short term construction financing and therefore allow for a lower equity requirement.

162. **Credit Institution Level**. SREP funds could be more significantly leveraged by providing funding to local credit institutions, which would on-lend to the SHP sector. Access to long-term, cost-efficient funds by the banking sector is a key financial barrier to SHP development. The structured fund would have a transformational impact by focusing on the SHP project pipeline and underwriting criteria of the credit institution it supports. The structured fund would use SREP funds as a first tranche and be leveraged by debt provided by institutional investors such as MDBs or local banks looking to enter the SHP financing market at a higher level in the capital structure. The pension and insurance sectors in Nepal could also participate in more senior debt. The investments of the structured fund in the Credit Institutions may be in funded or contingent form and may also address a particular asset or risk. For example, the investment could be made to buy down high interest costs of the credit institutions such that their blended cost of funds is lowered, or to provide extension financing facilities to cover longer tenors to the credit institutions in case their liability portfolio is shortened as is currently occurring in Nepal. The fund would be exposed to risk related to each credit institution rather than the underlying SHP project.

163. **Recommended Financing Structure**. An SHP structured facility, which provides capital commitments to credit institutions would be the best use of SREP funds to scale-up SHP in Nepal. The SHP Structured Facility should be offered to pre-selected credit institutions ("Partner Banks") that would finance SHPs meeting defined "Eligibility Criteria". Furthermore, a Technical Assistance Program component funded by the SREP contributions is recommended to provide advisory services and technical assistance for capacity building, SHP market information sharing, and developing SHP project financing expertise. **Annex 10** provides a Concept Paper on the proposed SHP Structured Facility

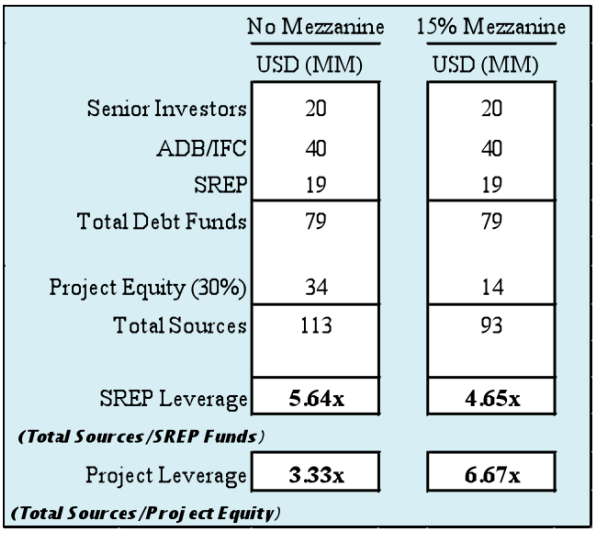
164. Figure 6.1 below provides an illustration of the proposed SHP Structured Facility. The SHP Structured Facility would initially be funded by a combination of allocated SREP funds which provide a first-loss layer above which the MDBs would commit a pro-rata share of financing

Figure 6.1: Proposed SREP Structured Facility



capacity. The MDBs could subsequently raise additional capital from local financial institutions either on a senior basis, as shown in the structural diagram, or pari-passu with the MDBs based on prevailing needs and local market appetite. The MDBs would also retain the ability to syndicate all or a portion of their committed financing capacity to the private sector. Figure 6.2 illustrates the effective leveraging of SREP funds. The compound financial leverage of the SHP Structured Facility could, based on conservative assumptions, exceed the 4:1 SREP guidance as measured by the total SHP capital sources mobilized by the SREP donor funds. Furthermore, to the extent that any SREP funds are used to provide subordinated capital to SHP Projects, the financial leverage as measured by the project equity capital would be higher for a 15% Mezzanine investment option (see Figure 6.2). It is important to note that the actual leverage of the SHP Structured Facility when implemented is subject to change and is dependent on factors such as the investment committee requirements of each MDB, the investment appetite of local financial institutions, the financial strength of the partner banks, and the viability of their SHP project target portfolios.

Figure 6.2: Potential SREP Leverage with and without Mezzanine financing



165. The proposed SHP Structured Facility would maximise the leveraging of SREP funds while retaining a flexible implementation mechanism, which is important given that the financing barriers to be addressed may change due to changing market conditions, financing practices, and policy responses by the GoN. Therefore, a market-responsive approach utilising a broader set of negotiated financing solutions may be more successful in deploying funds. The proposed SHP Structured Facility should not be programmatic in its execution; rather, it should foster negotiated solutions for each partner bank based on its financial profile and the merits of its SHP project target portfolio. The SHP Structured Facility may therefore require a higher level of human resources for origination, underwriting, and monitoring of each facility and it may be recommendable for the MDBs to assume the role of managing and administering the SHP Structured Facility.

166. **Annex 11** provides more detailed implementation and investment alternatives for the recommended SHP Structured Facility

6.2 Central Renewable Energy Fund

167. CREF is being established to consolidate and streamline present and future funding for the mini and micro RET sector through a single channel, including the absorption of REF. This will harmonise and simplify prevailing systems and procedures while incorporating new features, and thus attract greater investment and private sector participation in the sector.

CREF will provide subsidies and technical assistance (TA), as well as soft loans for the development and expansion of micro, mini and small hydro electricity, solar energy, wind energy and biogas, and improved cooking stoves, while not excluding applications arising from other forms of alternative energy.

168. The set up timeline for CREF is being coordinated by RREP for implementation by GoN.

169. For SREP mini and micro funding, the CREF will be closely linked to AEPC but administered independently of the day to day influence of AEPC, while operating within the modalities provided by the CREF Board. The prevailing REF administrative structure may therefore be modified and expanded to include CREF.

170. Under the arrangements being contemplated, AEPC may provide the Secretariat for the CREF Board, thus playing an important role in the formulation of operating modalities and later maintaining an oversight during program implementation. AEPC may also serve as the technology adviser to CREF, while clearly segregating its technical advisory and Secretariat roles to avoid conflict of interest.

171. The draft regulations[44] propose that CREF will be governed by a Governing Council consisting of 11 members with representation from relevant government agencies and the private sector, with the Executive Director of AEPC also functioning as Secretary. The draft also proposes an Executive Committee for day to day management.

172. CREF would constitute several windows of financing representing the fund delivery mechanism of each donor/program. REF will be merged into CREF. However, as the delivery mechanism of REDP (now RERL) varies significantly in that funds are disbursed through the decentralised district administrations, it may be likely that this method of delivery will continue. The biogas component already has a credit scheme and its delivery will be through the CREF. The challenge for CREF is to incorporate the different subsidy and credit delivery mechanisms seamlessly.

173. The two main funding instruments envisaged for mini and micro energy initiatives are subsidy and debt. The subsidy thresholds (**Annex 4**) and delivery mechanism for each RET (Section 5) will be similar to that at present, but delivery will be through CREF.

174. The SREP funds, which will be a grant to GoN, will flow through the MoF and NRB into CREF. The amount to be disbursed as subsidy will flow to the RETs in a similar manner as at present in accordance with the GoN Subsidy Policy. The portion to be used for lending will flow through a Debt Revolving Fund within CREF to be re-lent to the banking sector/Participating Financial Institutions (PFIs) for on-lending to retailers such as LFIs and MFIs. PFIs may also lend directly to end users. All repayments from PFIs, LFIs and MFIs will flow back to the Debt Revolving Fund for further lending. All funds borrowed need to be

[44] 'Drafting Regulations for the Formation of the Central Renewable Energy Fund', draft final report of February 2011; prepared for AEPC by Vipramshree Energy Pvt. Ltd., Nepal in joint venture with Legal Research and Development Pvt. Ltd., Nepal

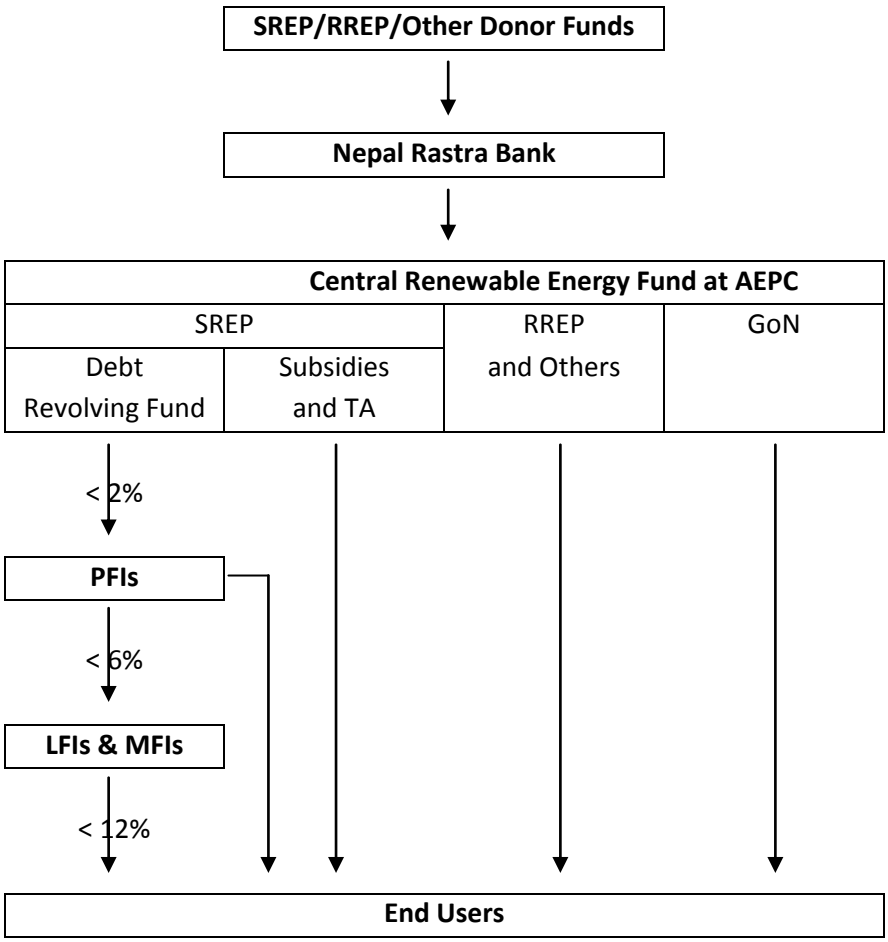
repaid, and hence PFIs assume the credit risk of LFIs/MFIs, while the latter assume the credit of end users.[45]

175. Collateral for PFI loans to LFIs/MFIs may be the usual asset mortgages and guarantees. When LFI/MFIs lend to individual end users in the micro energy sector, formal or complex collateral arrangements do not apply, as they instead rely on peer pressure through group guarantees, recognition of seasonal income patterns and other informal methods which are more appropriate to the rural poor.

176. Guidelines and criteria will apply in respect of selection of PFIs, re-lending and on-lending terms, collateral, eligibility of purpose and end users. For instance interest rates levied by CREF will be a maximum of 2% p.a. to cover administrative costs, by PFIs limited to 6% p.a., and by LFI/MFIs limited to 12% p.a. The maximum spreads of 4% for PFIs and 6% for LFI/MFIs are within industry norms. The maximum tenor of loans from CREF to PFIs will be seven years, and the same will apply for loans from PFIs to LFI/MFIs.

177. The proposed funds flow structure is presented in the Figure 6.3 below.

Figure 6.3: Proposed CREF Funds Flow Structure



[45] Lessons learnt from the Nepal PDF and the successful Sri Lanka ESD and RERED Projects (both WB and GEF-assisted) will be considered in the design

6.3 Role of Private Sector and Leveraging of Resources

178. The Nepal SREP funding of USD 40 million will be leveraged at least 1:4 with additional resources comprising credit, grant and equity from other development partners, GoN and the private sector. The SREP funding will be divided roughly equally between small hydro power (SHP) projects up to 10 MW in capacity, and mini and micro energy initiatives. In addition, a sum of USD 60 million is available as SREP Reserve for utilisation by Nepal and other countries.

179. In general, the prevailing platform and modalities will be adopted for the implementation of the mini and micro energy initiative component as discussed earlier. SHP projects, and where appropriate mini hydro projects, will continue to adopt the PPP model, with equity financing from the private sector. To provide further impetus, GoN has introduced a 'White Paper on IPPs' and is planning to establish a PPP cell within the NPC.

180. Grant funds sourced from donors and development partners will be channelled through CREF that will essentially provide (i) subsidies and TA, and (ii) refinance to financial institutions that lend directly or indirectly to the renewable energy sector.

6.4 Program Targets for 2012-2017

181. The SREP Investment Plan (SREP-IP) covers a five-year period from October 2012 to September 2017. Being part of a greater RET program (albeit still under development that will include RREP and other yet to be identified projects and partners), the SREP inputs will be viewed as a complementary component supporting national targets, and not as an independent project. RREP is expected to be operational by mid-2012.

182. Accordingly, the following overall program targets have been used in preparing the SREP-Investment Plan[46]:

Small hydro power	...	...	50 MW[47]
Mini & micro hydro	...	...	30 MW[48] (skewed towards micro hydro)
Solar home systems	...	...	500,000 systems
Biogas, domestic	...	...	140,000 plants
Biogas, institutional	...	...	10,000 plants

6.5 Cost Estimates

183. The costs of the above plants or systems vary according to capacity and geographic location. The latter affects costs through factors such as availability of physical infrastructure, access, distance, terrain and the like. Costs also vary with time. **Annex 12** provides average historical

[46] Meeting with AEPC on 16 Aug 2011

[47] SHP is developed primarily by the private sector (since NEA has stopped constructing SHP) and there are no specific targets. During the period 2002-2010, an average of 4.2 MW p.a. of SHP was developed

[48] Meeting with AEPC on 16 Aug 2011, but scaled down from the proposed 60 MW to reflect current realities

costs of typical plants and an estimate of future costs (or pre-subsidy market prices as the case may be) that are expected to prevail during the Plan period. They are summarised below:

Small hydro power	NPR 162,000 (USD 2,250) per kW
Mini & micro hydro power ...	NPR 320,000 (USD 4,444) per kW
Solar home systems	20 Wp, NPR 18,000 (USD 250) per system
Biogas, domestic	6 m^3, NPR 60,000 (USD 833) per plant
Biogas, institutional	25 m^3, NPR 225,000 (USD 3,125) per plant

Other assumptions:

Exchange rate	NPR 72.00 = USD 1.00
Private sector equity	20% of project cost[49]
GoN contribution	15% of project cost as applicable
Initial allocation from SREP ...	USD 40 million, split equally between SHP and mini/micro energy initiatives, with each having its own disbursement mechanism
Total financing from RREP ...	USD 180 million
Financing by 'others'	To bridge the financing gap
Other RETs[50] ...	Projects outside the scope of SREP

6.6 Financing Plan

184. Table 6.1 below provides the financing plan. The Investment Concept Brief for SHP is given in Annex 10. The Investment Concept Briefs for mini-micro hydropower, solar PV and biogas are provided in Annexes 13, 14 and 15 respectively.

Table 6.1: Financing Plan, USD '000

Investment	GoN	SREP Initial Allocation	RREP	Other (To be determined)	Private Sector Equity	Total	% of Total
Small hydro power		20,000		58,750	33,750	112,500	21
Mini & micro hydro	20,000	5,579	56,944	24,144	26,667	133,333	25
Solar home systems	18,750	5,231	53,385	22,635	25,000	125,000	24
Biogas, domestic	17,500	4,882	49,826	21,126	23,333	116,667	22
Biogas, institutional	4,688	1,308	13,346	5,659	6,250	31,250	6
Other RETs	1,500		6,500		2,000	10,000	2
Technical assistance		3,000				3,000	1
Total	**62,438**	**40,000**	**180,000**	**132,313**	**117,000**	**531,750**	**100**

Notes:

- The SREP USD 20 million allocated for SHP will be disbursed through a structured facility/SHP fund for partner banks to provide debt financing.

[49] This allocation would be different for SHP as described in Section 6.1

[50] Such as improved cooking stoves, improved water mills, wind etc

- The SREP USD 20 million allocated for mini and micro energy initiatives will be disbursed through CREF and utilised as a grant for subsidies and technical assistance; and as loans through a revolving fund.
- 'Other' represents the funding gap. It will be bridged through funds from other donors, bank financing etc. However, it is expected to be at least partially addressed through an allocation from the USD 60 million SREP Reserve.
- The distribution of funding from 'Others' between the investment categories has been made in proportion to the respective total cost of each applicable RET[51]. However, it may vary depending on the donor/development partner selected for financing.

185. **SREP Reserve.** The funding gap (shown as 'Others') is large as it reflects the importance placed by GoN in scaling up energy access through RETs. This underscores the need for additional financing including a proposed allocation of USD 15 million from the USD 60 million SREP Reserve.

7.0 ADDITIONAL DEVELOPMENT ACTIVITIES

186. Table 7.1 below summarises the key initiatives of GoN, duly supported by development partners, in the energy sector[52].

Table 7.1: Additional Development Activities

No.	Project title	Donor	Unit	Allocated budget	Project completion date	Project description
1	Power development project -Part C	WB	USD	31 million		This project helps to construct Khimti - Dhalkebar 220 KV transmission line and other subprojects related to system reinforcement, NEA institutional strengthening, and distribution and rural electrification. The amount is just the initial allocation.
2	Energy efficiency through loss reduction project	ADB			2013	Reduce technical loss in the Kathmandu Valley and Birgunj corridor
3	Energy access and efficiency improvement project	ADB			2013	Construction of substation and switching station
4	Distribution system rehabilitation project	WB			2012	Improve technical losses and reliability of power supply, and to reduce technical losses in various places
5	Kathmandu valley distribution system rehabilitation project	WB			2013	Improve quality and reliability, reduce technical losses of power supply, particularly in Kathmandu Valley
6	Energy and customer accountability project	WB			2012	Regular energy audit of large customers, setting up remote GSM, and implementing GIS based network management
7	Project for solar powered street lighting					Pilot country program launched in 21 locations.
8	Energy efficiency in	ADB				

[51] Except for SHP which has only three sources of financing; hence 'Others' for SHP represents the total funding gap after accounting for equity and SREP financing

[52] NEA Annual Report 2011, AEPC Annual Progress Report 2009-10, AEPC Planning Unit

	lighting (CFL) project					
9	Energy Sector Assistance Programme (ESAP)	DANIDA, NORAD, KfW	NPR	3,828 million	2012	Preparation of national subsidy policy, TA for AEPC, financing for improved cooking stoves, micro hydro power, solar PV and setting up of solar test lab, REF and KKREP
10	Rural Energy Development Programme (REDP)	UNDP, World Bank	USD	9.305 million	2012	The fund is used for the subsidy to renewable energy and program support. The third phase of the programme was from 2007 to 2010 and extended up to March 2011
11	The Khimti Neighbourhood Area Development Project (KiND Project)	Himal Power Limited and UNDP			2011	The project is a kind of PPP to provide access to electricity to some 3,900 HH of Dolakha and Ramechhap districts through a 400 kW Haluwa Khola mini hydropower project in Namadi of Ramechhap.
12	Renewable Energy Project (REP)	EU	EUR	15,675,000	2011	REP commenced in April 2003 with support from the European Commission. It promotes the installation of institutional solar PV and solar thermal applications in schools, health posts and other institutions. The program will phase out in Feb2012
13	Biogas Support Program, phase IV	KfW/ GoN			2011	Thissupports biogas development in Nepal. BSP IV is the 4th phase of the program, and will end in 2011.
14	Improved Water Mill Program (IWM), Ujyalo Nepal Program& Special MH Program	GoN				This aims to provide access to electricity to HH of the selected districts through different RETs, the micro hydro being the principal technology. The Rukum Ujyalo Program was started in 2008 and the Ujaylo Nepal was initiated during 2009.
15	Micro Hydro Village Electrification Program (MHVEP)	WB	USD	12,000,000	2011	MHVEP commenced in 2003 with support from the World Bank under Power Development Project (PDP). This programis being implemented through REDP under AEPC. Phase 1 of the program was from July 2003 to December 2009. Phase II is being implemented from 2010 to December 2012.

8.0 IMPLEMENTATION POTENTIAL AND RISK ASSESSMENT

8.1 Implementation Potential

187. As discussed Section 3, several successful SHP and mini/micro energy projects and programs have been initiated in the country in the past. They have paved the way for formulating policies, setting up the legal and regulatory environment and developing financing mechanisms for subsidy delivery. Local capacity has also been developed in respect of a wide array of stakeholders, including manufacturers, installers, financial intermediaries and NGOs.

188. Many of the off-grid projects and programs have been repeated as follow-on projects, and more are being planned. The proposed SREP initiative will complement GoN's plans to scale up energy access through RETs.

189. Given the above and the huge commercially exploitable renewable energy potential of the country as noted previously, the overall implementation potential of SREP is favourable.

8.2 Risks and Mitigation Measures

190. **SHP Projects**. The risk matrix below (Table 8.1) was developed based on the identification of the principal risks to SHP development and the success of the SREP Funds in scaling up SHP in Nepal. The risk matrix also provides risk mitigation measures and allocates risks to the appropriate institution.

Table 8.1: Risk Analysis of Small Hydropower Projects

Risks for SHP Development	Risk Mitigation Measures	Risk Allocation
Political Environment		
Weak government and unclear political environment	Political risk insurance and guarantees	MIGA, ADB, Commercial insurance
Unstable law and order situation	Insurance and guarantees	Commercial insurance
Policy, Laws and Regulation		
Uncertain/unclear policies of the GoN	Formulate clear policies, laws and regulations in support of SHP development	MoE, GoN agencies
Conflicting policies and multiple agency involved	Streamline policies and create single-window approval process	MoE, DOED, GoN agencies
Institutional		
Weak capacity of GoN agencies, private sector, and local commercial banks to promote SHP	Capacity building and strengthening of agencies and institutions	GoN, MDBs, private sector
Conflicting roles of regulator and project developer	Separate institutional functions of regulation and licensing from project development role	GoN
Water management, power system planning and project development policies not in harmony	Strengthen capacity and authority of WECS, NEA or other water resource management and system planning agencies to harmonize planning functions	GoN
Single off-taker of power in the country which may decline power purchase	Open access for IPPs to sell directly to consumers, and facilitate power wheeling and access to export markets	GoN, NEA
Financial		
Poor liquidity of local commercial banks reduced ability to finance multiple SHP projects	Create funds such as SREP, extend credit lines and revolving funds to commercial banks for on-lending	MDBs
Commercial banks cannot access long-term low cost financing from international markets	Develop Foreign exchange risk mitigation instruments	MDG, commercial banks
IPPs cannot obtain low cost financing from foreign sources since PPAs are in local currency	Develop Foreign exchange risk mitigation instruments	MDG, commercial banks
Project finance options not available and only term loans available with low	Adapt due diligence to suit local market conditions, develop	Commercial banks, IPPs, MDBs

Risks for SHP Development	Risk Mitigation Measures	Risk Allocation
tenor, high cost requiring collateral guarantees – limits scale-up of SHP	flexible approaches to EPC contracting, educate IPPs and banks	
Low power purchase price reduces return to investors and limits scale-up of SHP	Develop REFIT for SHP based on return on investment, introduce or improve other fiscal incentives for SHP development	GoN, NEA, MDBs
Single off-taker of power is not creditworthy increasing risks for scale up of SHP	Create open market access, provide PRG and PRI risk mitigation instruments	GoN, NEA, MDBs
SREP Fund Structure		
Rigid Fund requirements may constrain ability of IPPs to access Fund benefits (as with WB's Power Development Fund)	Adapt Fund structure and requirements for local market conditions and needs, building flexibility without increasing default risks	MDBs, commercial banks, IPPs
Fund under GoN control may limit IPP access to Fund	Fund under commercial bank control with adequate controls and protections	GoN, MDB, commercial banks
Failure of SREP to leverage complementary funds in the ratio 1:4. Given high local financing cost, leverage of 1:4 does not alleviate SHP financing issues or improve commercial bank liquidity	Take flexible approach to leveraging of Funds. Complement with credit lines and other financing options. Use SREP Fund as guarantee Fund or to mitigate interest rate fluctuations	MDBs. Commercial banks
Technical		
Lack of transmission capacity to evacuate power from remote SHP locations	Integrate SHP planning with transmission system planning for optimal SHP scale-up strategies	NEA, DoED, MoE
Low load factor of SHP with low generation during high power demand period forcing NEA to rethink PPAs with SHP	Improved water resource management and SHP project design and approval process. Create open market access for direct sales to consumers, and facilitate exports	WECS, DoED, NEA, IPPs NEA, MoE, IPPs
Environmental& Social		
Forest land use policies, forest land compensation, and related permits take long time	Streamline and simplify policies for SHP up to 10 MW, and create one-stop window	GoN, MoEn, MoF, DoED
IPPs expected to develop schools, hospitals and other facilities for local communities which increases projects costs and distracts from project development and scale up of SHP	Balance social obligations with financial returns required by IPPs through greater interaction with DDCs and VDCs Increase SHP power purchase price to cover eligible and verified investments	IPPs, DDC, VDC, GoN agencies
Local community resentment towards	Greater engagement with local	DDCs. VDC, IPPs, GoN

Risks for SHP Development	Risk Mitigation Measures	Risk Allocation
projects that do not benefit them and are seen as "stealing of local resources" for benefits of others	communities to improve understanding	agencies

191. **Mini and Micro Energy Projects**. Table 8.2 below summarises the main risks in the SREP implementation of mini and micro energy projects and identifies possible mitigation measures.

Table 8.2: Risk Analysis of Selected Mini and Micro Energy Projects

Risk	RET	Mitigation Measures
Political/Economic/Institutional		
Shifting economic priorities of Government	All	Economic stability; annual budgetary allocation of required funds by GoN, particularly for mini/micro RETs
Failure of SREP to attract the expected amount of complementary funds from donors and others	All	Political stability; visible and timely action by line agencies in meeting SREP milestones; resolution of constraints faced by financial institutions (see below) and others; continuity of GoN's subsidy policy.
Faulty design and/or delays in the setting up of the required systems, controls and governance structures for the proposed Central Renewable Energy Fund (CREF)	All	Effective segregation of the technical/advisory function of AEPC from its CREF secretariat role in the CREF management structure; CREF to be administered by an independent and professional fund manager who operates under guidelines specified by the CREF Board.
Fiduciary capacity of AEPC to function as the Secretariat for the CREF Board, duly separated from its technical advisory role	All	To be assessed by DANIDA as part of RREP development; capacity building through TAwhere required
Financial		
Limited access to capital by developers as financial institutions face liquidity problems, asset-liability mismatch on tenors, and a general lack of expertise in structuring project finance - the last leading to perceived higher risks and the consequent imposition of high collateral requirements	Mini hydros	GoN and MDB to facilitate access to affordable long-term funds through a line of credit and/or a revolving fund; training on project evaluation, project finance structuring and risk sharing mechanisms for lending institutions
Delays in the release of subsidies/TA funds due to budgetary constraints.	All	Mechanism for timely annual budgetary allocations and disbursements; clarity of purpose and simplified procedures when drafting the Project Operating Guidelines; adequate delegation of decision making powers with accountability
Environmental		
Deforestation and soil erosion caused by site clearing, construction etc; non-sustainable	All hydros, biogas	Enforcement of compliance with environmental safeguard rules and regulations by all concerned

Risk	RET	Mitigation Measures
harvesting of forest resources for fire wood.		(e.g., evidence of compliance a pre-condition for loan/grant approval and subsequent disbursements); improved public awareness
Resource constraint, particularly caused by upstream diversion and/or climate change	All hydros	Enforceable water rights; global action on climate change
Social		
Disruption within community based organisations (CBO) during project implementation due to loss of skilled personnel, disputes etc	Community based micro hydro	Effective social preparation and team building during project formulation; follow up assistance where required; leadership training and succession planning
Constrained ability to pay by the targeted community, mainly due to high upfront costs and irregularity of income streams	Mini and micro hydro, solar PV, biogas	End use applications for income generation activities[53]; group lending schemes for risk sharing; compulsory savings scheme to meet contingencies and component replacements
Technical		
Uncertainty of product reliability and service backup	Mini and micro hydro, solar PV	Technical standards with effective mechanism for enforcement and remedial action
Lack of technical or commercial skills by end users, lenders and the bureaucracy leading to delays in decision making	All	Capacity building
Demand growth exceeding installed capacity after project commissioning	Mini and micro hydro, solar PV	Remove the limit of 120 W/HH for micro hydros, consider enforcing the use energy efficient loads such CFLs and not incandescent lamps; design a scheme to support the financing of SHS upgrades, as these systems are modular

9.0 MONITORING AND EVALUATION

9.1 Scope

192. As discussed in previous Sections, SREP in Nepal will support the expansion of energy access and stimulate economic growth through the scaled-up deployment of renewable energy solutions; and provide a trigger for transformation of the renewable energy market through a programmatic approach that involves government support for market creation, private sector participation, capacity building of key stakeholders and productive energy use.

9.2 Key Performance Indicators

[53] This could be programmed without leaving it entirely for the market to determine. A possible approach could be through an 'innovation solicitation' window for developers to attempt new initiatives, supported by cost-shared grant funds, as in the WB and GEF-assisted Sri Lanka Renewable Energy for Rural Economic Development Project

193. Accordingly, the performance of the SREP intervention will be measured along the lines indicated in Table 9.1 below, the targets being incremental values for the five-year plan period.

Table 9.1: Results Framework

Results	Indicators	Targets
1. Increase in the number of HH and enterprises supplied with electricity	No. of new HH connected to a mini grid[54]	250,000
	No. of new HH using SHS	500,000
2. Productive end use of off-grid electricity	No. of new mini grid consumers using electricity for productive/income generating activities	TBD
3. Increase in renewable energy supply	Capacity addition to the main grid through small hydro power	50 MW
	Capacity addition through mini and micro hydro power	30 MW
	Capacity addition through stand alone solar PV[55]	10 MW
	Capacity addition through domestic biogas plants	140,000 plants
	Capacity addition through institutional biogas plants	10,000 plants
4. Additional funding leveraged by SREP	Leverage factor, measured as SREP funding: all other sources	At least 1:4
5. Financing by banks for renewable energy projects	Total number of banks accredited as PFIs	TBD
	Total number of loans disbursed	TBD
	Total value of loans disbursed	TBD
6. GHG emission mitigated[56]	Through small hydro power	TBD
	Through mini and micro hydro power	69,000 tCO_2 p.a.
	Through solar PV	62,857 tCO_2 p.a.
	Through domestic biogas plants	700,000 tCO_2 p.a.
	Through institutional biogas plants	21 tCO_2 p.a.

[54] Assuming 120 W/HH based on prevailing rules, but may change during the Plan period

[55] Assuming 20 Wp SHS based on current trend

[56] Using conversion factors presented by AEPC for mini and micro RETs: 'The Environment of the Poor in the Context of Climate Change and the Green Economy - Alternative Energy Linking Climate and Environmental Considerations', 2010

Annex 1

STAKEHOLDER CONSULTATIONS: SMALL HYDROPOWER

1. To understand the context for the development and scale-up of SHP in Nepal, extensive discussions were held with various stakeholders. These discussions are the basis for the learning of the context for developing SHP, the barriers and risks to development of SHP, and lessons learned. The discussions have guided the TA Consultants in formulating the concept for developing a roadmap for the development of SHP, and have helped in the identification of options for structuring the SREP Fund for SHP. The discussion with these principal stakeholders to SHP development in Nepal is summarised below.

DoED

2. The **restructuring of the Department of Electricity Development (DoED)** is under discussion. It is proposed to establish three (3) regional offices around the country and three (3) offices in each of the river basins to develop People's Hydropower Projects (PHP). It is planned for the DoED to get more involved in the preparation of feasibility studies for hydropower and prepare request for proposals (RFPs) to invite competitive bids from project developers. The DoED believes that no new agency is required to develop SHP in the country and the DoED should develop these projects (as it will also be developing the PHPs). But the focus of DoED is on projects larger than 10 MW. DoED recognises that it needs to develop its capacity to develop such [smaller?] projects. Capacity development is also needed for equipment manufacturers and suppliers, O&M firms, etc.

3. There is a proposal to **revive the ETFC** and expand its mandate to regulate transmission tariffs (if a new Grid Company is formed) in addition to retail tariffs. However, the bill to establish an independent regulator is yet to be passed.

4. A new **Hydropower Investment Development Company (HIDC)** has been registered to invest in hydropower projects above 25 MW. The HIDC has an authorised capital of NPR 500 million, and paid up capital of NPR 100 million. HIDC has investments from GoN, Employee Provident Fund, National Insurance Company, and Citizen Investment Fund. HIDC will invest in hydropower projects above 25 MW. The Energy Crisis Commission is considering subsidies for specific hydropower projects.

5. The DoED believes that the **Power Development Fund (PDF)** failed because the Fund conditions were difficult to comply with given the situation in Nepal, and the board of the PDF was dominated by GoN personnel. Also, the Bangladesh-Nepal Bank was not an effective Fund Manager.

6. There is an urgent need to **update and revise the hydropower master plan**. In the absence of an updated master plan, hydropower projects are not being optimally allocated. The Water and Energy Commission Secretariat (WECS), which is responsible for hydropower policies, is non-operational due to lack of staff.

7. DoED is launching a **People's Hydro Power (PHP) scheme**. The GoN collects about NPR 1.0 billion annually in royalty payments, of which about 50% goes to District Development Councils (DDCs). DDCs are free to use the revenues as they see fit and may develop hydropower or other infrastructure projects. The PHP scheme plans to tap royalty payments made by IPPs and encourage DDCs to develop SHP Projects. The PHP program proposes to develop SHP projects entirely with equity and no debt. Since DDCs have no capacity to develop SHP, it is planned for the DoED to develop the project and then transfer it to the DDC after commissioning. The DDCs however wish to develop PHP projects on their own though they do not have the capacity to prepare good quality feasibility reports and meet due diligence requirements. DDCs also do not wish the DoED to issue licences to IPPs in their operational areas (or jurisdictions).

8. Under the PHP, people's participation in equity would have to be a minimum of 10%. DDC, FNCCI, and Cooperatives would also likely contribute money. The remaining required funds would be publicly funded (by the GoN), which would be initially treated as a grant and later converted to equity for the DDC. The modality of the share of DDCs etc. has not been fixed. Once the 10% contribution from the local body is confirmed, studies will be performed by the DoED and the plant developed by the DoED. After construction, the plant would be transferred to the DDC and a company formed to take over the operation and maintenance of the power plant.

9. PHP projects under 1 MW will attract a subsidy of 75%, projects in the 1-3 MW range will attract a subsidy of 50%. Subsidies for projects in the 3-25 MW are undecided.

10. PHP projects require that 10% of the electricity be used for rural development. Private sector will be given access to develop projects. There is also a possibility of developing projects on a PPP basis.

11. The implementation modality for development of PHP has not been finalised. Consultants will be hired to assist in developing the projects. Consultants will be hired at the central (DoED) level to support the program unit, and additional project-level consultants would also be hired to support the DDCs. A Project Facilitation Committee would coordinate activities. NEA system planners have not yet been consulted about the impact of PHP on the grid.

12. The 5-year plan of the PHP is to develop 4 projects in each of the three river basins. Projects would range from 5-25 MW with the average project size being about 15 MW. Thus a total of about 180 MW of PHP projects are to be developed during the 2011-2016 period. Project implementation would be phased – Phase I would implement six projects, and the remaining six projects would be taken up in Phase II.

13. DoED would prepare feasibility studies and prepare RFPs to competitively procure the services of IPPs to develop the projects. About NPR 2 billion are required for the first year of the program, but only about NPR75 crore [?] is being sought in the new financial year. It is estimated that the PHP program will require an estimated total outlay of NPR 34 billion for 12 projects, 150 km of transmission lines, 50 km of roads, and 10% RE [?]. The goal is to develop 180 MW in 5 years.

14. There is also a new proposal to develop about 50 MW of SHP with contributions from civil servants. The implementation modalities for this scheme have not yet been finalised.

Alternative Energy Promotion Centre (AEPC)

15. AEPC's mandate is to develop projects up to 1 MW, but this is being revised upwards to 5 MW, and eventually to 10 MW. But it is not clear if the AEPC has the capacity to develop grid-connected SHP since their experience in hydropower thus far has been the development of off-grid micro hydro projects.

According to the AEPC, some of the principal barriers to developing SHP include:

- No integrated river basins
- Lack of funds
- Poor policies
- No law requiring the NEA to purchase non-conventional energy
- Low load factor of hydropower projects
- NEA's creditworthiness, since it is the only off-taker of power

16. SREP should learn from the PDF experience and design the Fund to be adaptable to the situation in Nepal. The Rural and Renewable Energy Program (RREP) is an NPR 180 million program with seed money under CREF, and could perhaps be merged with the SREP Fund.

Nepal Electricity Authority (NEA)

17. NEA faces a problem with **shortage of energy during the dry season, and surplus energy in the wet season** when it has to back out its own generation plants. NEA is thus not keen to purchase expensive IPP power during the wet season. Going forward, NEA plans to sign PPAs with SHPs only for supply of firm power during the dry and wet seasons. NEA will continue to honor the old PPAs but will not sign new PPAs for non-firm power. NEA contends that power shortages during the dry season will continue even in 2017. NEA suggests that IPPs obtain back-to-back PPAs for sale of power during the dry season to NEA and to PTC/India during the wet season.

18. Retail tariffs in Nepal have not been increased in some 10 years and **NEA losses are growing**. There is a wide discrepancy between cost of supply and cost of purchase, and NEA makes a loss of some 2.42/kWh, which amounted to NPR 5,351 million as total net loss for FY 2009/10. Accumulated losses at the end of FY 2009/10 reached NPR 19,469.75 million.

19. The **high Cost of Service for NEA** is principally due to the increased internal purchase at relatively higher tariff at generation point, annual escalation on purchase tariff, operation of thermal plants, import of very high cost seasonal energy from India, regular imports at relatively higher price, increased staff cost, increased maintenance cost and hike in prices of fuel and other commodities, all of which cannot be offset by the prevailing retail tariff.

20. Despite its financial troubles, NEA has been honoring PPAs with IPPs, while it is deferring or not making other payments.

21. NEA is in the process of **updating the 1998 transmission master plan**, which is expected to take 8-10 months once the study contract is awarded. The earlier transmission master plan covered lines up to 132 kV only, and the new system will include 220/400 kV lines. Large power projects developed primarily for exporting power will develop their own transmission lines, but NEA will have to develop transmission lines to off-take the free power.

22. NEA agrees that the **PHP concept** is good but foresees difficulties with implementing the scheme. NEA does not think that DoED has the capacity or the expertise to develop PHP. While the concept of public ownership is good, private sector should be contracted to operate and maintain the plants. NEA feels that a separate entity should be created to implement the PHP scheme.

23. The NEA has not been consulted about the PHP scheme and is concerned that the DoED's PHP plan is for a specific area and for a defined timeline, which does not consider NEA's transmission master plan. But over the longer timeframe, NEA believes that the transmission system will cover the planned PHP areas.

24. There is presently no clarity on the establishment of a **separate Transmission Company**, though there are plans to establish a grid company, which would be responsible for transmitting power at EHV and the firm would act as the system planner.

25. There are also plans to establish a **Power Trading Company** (PTC) to deal with exports and imports to and from India.

26. The **institutional structure for developing hydropower** is weak, and it is not clear how the AEPC would be able to develop SHP up to 10 MW since its mandate is to develop off-grid projects. Since AEPC receives government grants to develop projects, NEA believes that SHP developed by AEPC should not be eligible to receive the same tariffs as IPPs, which receive no grant and have higher financing costs.

27. NEA has notified 24 IPPs, which have received PPAs but have not implemented projects as scheduled.

28. The **SHP division at NEA has been disbanded** and its responsibilities handed over to regional offices of the NEA. NEA is of the opinion that the high cost of financing is a principal barrier to development of SHP. NEA contends that given the benefits of off-grid projects, SREP support for SHPs should focus on installations in remote off-grid locations. But NEA acknowledges that SHP in the 1-10 MW range would generally be connected to the 11-33 kV system and would improve grid stability. NEA's own priority is however to develop and promote hydropower projects above 50 MW.

Ministry of Energy (MoEn)

29. MoEn believes that financing is a key barrier to SHP development and SREP would help PHP and other IPP projects that have PPAs. MoEn is thus of the opinion that SREP financing for SHP should be a minimum of USD 25 million and perhaps even higher considering the need to alleviate financing problems.

30. The SREP Fund for SHP should be managed independent of the CREF, and with a Steering Committee at the National Planning Commission. SREP funding could be used as an equity fund for both public and private projects. MoEn estimates that some 30-35 projects in the 1-10 MW range should be available for making investments. PHP projects could also benefit from the SREP funds.

31. The MoEn is clear that government should not be developing SHP, and DoED does not have a mandate to develop projects. MoEn is of the opinion that the government should only be involved in developing hydro projects which include a reservoir since private sector has no appetite to develop reservoir projects.

32. The Hydropower Investment Development Company was originally meant to finance projects greater than 25 MW. But it is likely that the HIDC will also finance projects in the 1-10 MW range. The HIDC will need capacity building in several areas including conducting due diligence on project opportunities. Others believe that the HIDC should only finance projects larger than 50 MW.

IPPAN

33. IPPAN members welcome the availability of SREP funds to promote SHP, but they are of the opinion that for the Fund to be successful, it should be under private sector control with a professional Fund manager, and not under GoN control. IPPAN provided insights into the various barriers they face in the development of SHP. While many of these barriers are known, the discussions with IPPAN identified some critical challenges that need to be overcome if Nepal is to develop SHP with private sector participation.

Ministry of Environment (MoEnv)

34. The cabinet has provided in-principle consent to enhancing the mandate of AEPC to develop projects up to 10 MW. There is a move to give AEPC greater autonomy and responsibility to develop SHP. MoEnv is of the opinion that AEPC should take the lead with SHP development and utilisation of SREP funds.

Clean Energy Development Bank (CEDB)

35. CEDB is working with several IPPs to finance SHP in the 1-10 MW range. The bank considers these projects to be relatively low risk, and the bank has a strong due diligence team to evaluate SHP proposals. The capacity of entrepreneurs to develop good proposals is weak and the bank's due diligence team assists project developers.

36. IPPs are unable to raise equity of 20-30%, which is required by many Funds, and this poses a constraint. Fund structure should be developed with a clear understanding of the market situation in Nepal.

37. The bank is aware of the weak creditworthiness of NEA, the single off-taker of power. But the bank does not view this as a major risk since NEA is a government entity and the view in Nepal among IPPs and banks is that the GoN is unlikely to let IPPs take a loss in case of NEA payment defaults.

38. The CEDB is willing to make available project finance but the IPPs are unable to meet basic eligibility criteria including raising adequate equity upfront. Also, IPPs do not have insurance against many risks, nor do they have EPC contracts. The bank is thus forced to make term loans against personal guarantees. But this limits the ability of developers to implement multiple projects.

39. The typical term of loans is about 7-10 years including construction. The banks do not have access to long-term low-rate financing and access capital at floating rates. This results in high interest rates of 14-16%, or even higher.

40. The CEDB, along with other investors, has established a Hydro Fund of some NPR 240 million. No single commercial bank in Nepal has the ability to finance beyond 1 MW on a single project, and syndicated loans with multiple banks are the only option.

41. The SREP Fund, to be successful, should be managed entirely by the private sector with no involvement of GoN entities. It is unlikely that the banks will be able to leverage finances 1:4 as required by SREP. If SREP provides only 20%, it does not help alleviate the problems with liquidity and the cost of financing projects in Nepal. A leverage of 1:1 is more practical. Given the size of the proposed Fund, it should primarily serve as a Guarantee Fund and support interest rate fluctuations.

42. Local banks have a capacity to finance no more than 150 MW annually (others say it could be as low as 50 MW annually). Given the capacity of local banks, they will be unable to finance a single project of greater than 50 MW. Introduction of Forex risk instruments will help banks access cheaper capital from foreign banks.

43. Local banks would not favor PPP projects in which the public sector has a majority shareholding, but may be willing to finance projects where the private sector has majority stake.

Annex 2

STAKEHOLDER CONSULTATIONS: MINI AND MICRO ENERGY INITIATIVES

First Workshop on 06 July 2011

1. A two-part workshop was conducted at Radisson Hotel, Kathmandu on 06 July 2011 to explain the scope and purpose of SREP and elicit views from a broad spectrum of stakeholders. The morning session, attended by about 80 participants, focused on Small Hydro Power, while Mini and Micro Energy Initiatives were taken up in the afternoon session that was attended by about 50 participants. The event was organised by the MDB Joint Mission comprising Asian Development Bank, World Bank and International Finance Corporation and the Government of Nepal represented by the Ministry of Environment and the Alternative Energy Promotion Centre. SREP national and international consultants also participated in the event.

2. The key suggestions towards the design of the proposed SREP intervention for mini and micro energy initiatives are summarised below:
   - The micro hydro installation companies noted that the limit of 120 Watts per household (HH) is a hindrance as actual HH consumption tends to increase over time. Instead, it may be better to allow the community to decide on the limit per HH and the resultant tariff on a case by case basis.
   - There should be a more effective 'smart subsidy' policy for RETs reaching to poor and marginal people; likewise they should have better credit access in these remote areas.
   - The domestic biogas program should be expanded to include community and institutional ones, coupled with better access to credit facilities.
   - For solar home system installations, the major constraint is the availability of financing for both the installer (working capital) and the end user.

Second Workshop on 09 September 2011

3. A half-day workshop was conducted on 09 September 2011 at Hotel Soaltee, Kathmandu to present the draft SREP Investment Plan and obtain feedback from a broad spectrum of stakeholders. The session, attended by about 75 participants, focused on both Small Hydropower, as well as Mini and Micro Energy Initiatives. The event was organised by the Ministry of Environment with representation from Ministry of Energy, Asian Development Bank, World Bank and the Alternative Energy Promotion Centre. SREP national consultants presented the SREP Investment Plan that included both, Small Hydropower as well as Mini and Micro Energy components.

4. The discussion generated views on implementation aspects as well as administrative and process issues to be addressed when finalising the SREP Investment Plan. The key suggestions from participants regarding mini and micro energy development are as follows:
   - There should be a focus on capacity building of the private sector

- The flow of funds to the end user/private sector should be streamlined through an effective mechanism
- The processes and procedures for funds flow and institutional arrangements to be clear and transparent, with an effective monitoring mechanism in place
- The SREP intervention should address transformation impacts such as gender and social inclusiveness, climate change, and socio-economic co-benefits
- An aspect of scaling up should include commercialisation of new technologies such as biogas electrification
- For solar home system installations, the major constraint is the availability of working capital financing for the installer and consumer loans for the end user.

At the close of the workshop, it was concluded from the chair that:

- The SREP Investment Plan should be ready on time and of high quality, so that it gets approved without delay
- The Investment Plan is being proposed by the government, and it should address both SREP as well as national objectives
- The Investment Plan and its implementation should address GHG emission reduction, which is also a source of additional revenue for the country.

Other Stakeholder Consultations

5. **Discussions with Banks.** Many banks are relatively new to lending to end users of RETs. Nevertheless they are keen on expanding their RET portfolio given the huge potential and the fact that RETs qualify as "deprived sector" lending (banks are required to maintain at least 3% of their portfolio in the deprived sector of face penal charges). The major barrier they face in lending to the sector is liquidity and mismatch in tenor. Banks mobilise deposits which are costly, that also have a short tenor.

6. Credit delivery is another concern as banks do not have the outreach nor capacity to administer relatively small loans in remote areas. However, banks do work with MFIs as well as LFIs who retail credit. This is a model that was introduced by ESAP which has been largely successful although in a very small scale, as the banks rely on internally mobilised funds. The LFI model holds promise, but banks have expressed the need for a source of affordable long-term refinance if it is to be scaled up.

7. **Discussions with Donors.** The major donor-funded programs in the sector are ESAP, RERL, and REP, all of which are coming to a close in 2011 and 2012. A follow on project for ESAP, namely RREP, is already under preparation.

8. Whilst these programs are entirely subsidy driven at present, the delivery mechanisms vary significantly. AEPC's objective is to streamline the delivery of all donor funded programs within a central fund (CREF), the administration structure for which is already in place through the REF.

9. It is the intention of the donor community to move away from full-subsidy driven programs in the future, and instead introduce a mix of subsidy and credit.

Annex 3

TARIFF RATES
Nepal Electricity Authority

Effective from 17 September 2001

1	**DOMESTIC CONSUMERS**			
	A	**Minimum Monthly Charge: Meter Capacity**	**Min. Charge NPR**	**Exempt kWh**
		Up to 5 Ampere	80.00	20
		15 A	299.00	50
		30 A	664.00	100
		60 A	1394.00	200
		Three phase supply	3244.00	400
	B	**Energy Charge, NPR/kWh**		
		Up to 20 units	4.00	
		21 - 250 units	7.30	
		Over250 units	9.90	
2	**TEMPLES**			
		Energy charge, NPR/kWh	5.10	
3	**STREET LIGHTS**			
	A	With energy meter, NPR/kWh	5.10	
	B	Without energy meter, NPR/kVA	1860.00	
4	**TEMPORARY SUPPLY**			
		Energy charge, NPR/kWh	13.50	
5	**COMMUNITY WHOLESALE CONSUMER**			
		Energy charge, NPR/kWh	3.50	
6	**INDUSTRIAL**		**Monthly Demand Charge, NPR**	**Energy Charge, NPR**
	A	Low Voltage (400/230 Volt)		
		(a) Rural and Cottage	45.00	5.45
		(b) Small Industry	90.00	6.60
	B	Medium Voltage (11 kV)	190.00	5.90
	C	Medium Voltage (33 kV)	190.00	5.80
	D	High Voltage (66 kV and above)	175.00	4.60
7	**COMMERCIAL**			
	A	Low Voltage (400/230 Volt)	225.00	7.70
	B	Medium Voltage (11 kV)	216.00	7.60
	C	Medium Voltage (33 kV)	216.00	7.40

8	NON-COMMERCIAL		Monthly Demand Charge, NPR	Energy Charge, NPR
	A	Low Voltage (400/230 Volt)	160.00	8.25
	B	Medium Voltage (11 kV)	180.00	7.90
	C	Medium Voltage (33 kV)	180.00	7.80
9	**IRRIGATION**			
	A	Low Voltage (400/230 Volt)	-	3.60
	B	Medium Voltage (11 kV)	47.00	3.50
	C	Medium Voltage (33 kV)	47.00	3.45
10	**WATER SUPPLY**			
	A	Low Voltage (400/230 Volt)	140.00	4.30
	B	Medium Voltage (11 kV)	150.00	4.15
	C	Medium Voltage (33 kV)	150.00	4.00
11	**TRANSPORTATION**			
	A	Medium Voltage (11 kV)	180.00	4.30
	B	Medium Voltage (33 kV)	180.00	4.25

Time of Day Tariff

Consumer Category and Supply Level			Monthly Demand Charge, NPR/kVA	Energy Charge, NPR/kWh		
				Peak Time	Off-peak	Normal
				18:00-23:00	23:00-06:00	06:00-18:00
A	**High Voltage (66 kV and above)**					
	1	Industrial	175.00	5.20	3.15	4.55
B	**Medium Voltage (33 kV)**					
	1	Industrial	190.00	6.55	4.00	5.75
	2	Commercial	216.00	8.50	5.15	7.35
	3	Non-commercial	180.00	8.85	5.35	7.70
	4	Irrigation	47.00	3.85	2.35	3.40
	5	Water Supply	150.00	4.55	2.75	3.95
	6	Transportation	180.00	4.70	2.95	4.15
	7	Street Lights	52.00	5.70	1.90	2.85
C	**Medium Voltage (11 kV)**					
	1	Industrial	190.00	6.70	4.10	5.85
	2	Commercial	216.00	8.65	5.25	7.55
	3	Non-commercial	180.00	9.00	5.45	7.85
	4	Irrigation	47.00	3.95	2.40	3.45
	5	Water Supply	150.00	4.60	2.80	4.10
	6	Transportation	180.00	4.80	3.00	4.25
	7	Street Lights	52.00	6.00	2.00	3.00

Annex 4

GOVERNMENT SUPPORT AND SUBSIDIES FOR RETs SELECTED FOR SREP ASSISTANCE

1. Government's support for the sector include the establishment of national, district, and community rural energy funds; provision of targeted subsidies; levy of concessionary or zero rated duty and taxes for selected equipment, and exemption of royalties and licensing requirements in the case of mini, micro and pico hydro systems.

2. The main features of subsidies and fiscal incentives for RETs selected for SREP assistance are summarised below.

SUBSIDIES

RET	Subsidy	Payment Terms
Micro/Pico Hydro	1. NPR 97,500 per kW for new projects up to 5 kW (Pico), or NPR 12,000 per HH whichever is lower 2. NPR 125,000 per kW for projects >5 kW to 100 kW, or NPR 15,000 per HH whichever is lower 3. Rehabilitation project of >5 kW capacity: lower of NPR 62,500/kW or 50% of installation cost 4. Additional transportation subsidy of NPR 500 per km/kW for more than 10 km distance from road head, but not exceeding NPR 30,000 and NPR 30,000 per kW for the projects that are located in Karnali zone and nearby 5. NPR 12,000 for grinding and NPR 27,000 for other end use applications; for remote areas an additional NPR 2,000 for grinding and NPR 3,500 for other end use applications. Likewise, a transportation subsidy of NPR 3,000 for the first category and NPR 4,500 for remote areas	30 % at the time of agreement, against bank guarantee 30% after delivery of equipment against bank guarantee 20% after power output testing, followed by release of bank guarantee 10% after power output verification Remaining 10% after completion of one year warranty period
Solar PV	1. NPR 7,000 (10-18 Wp) and NPR 10,000 (>18 Wp) per SHS installed in very remote areas 2. NPR 6,000 (10-18 Wp) and NPR 8,000 per SHS installed in the remote hills 3. NPR 5,000 (10-18 Wp) and NPR 6,000 (>18 Wp) per SHS in other areas 4. Institutional solar PV: Lower of NPR 15,000 or 75% of cost	Max. 80% advance against bank guarantee, and the balance 20% after completion, or full payment after completion of the scheme
Biogas	1. For 4-6 m^3 capacity plants NPR 9,000 (Terai), NPR 12,000 (Hills) and NPR 16,000 (Remote	NPR 2,000 advance against bank guarantee and the

	hills) 2. Additional NPR 700 per plant < 6 m^3 capacity for those installed in less penetrated districts; and NPR 2,000 in the Terai, NPR 2,500 in the Hills and NPR 3,500 in the Remote Hills respectively per plant for poor, deprived groups of people from the Poverty Alleviation Fund. 3. For institutional plants in the 4-8 m^3 capacity range that use biodegradable materials such as night soil, vegetable materials etc a subsidy of NPR 8,000 for plants installed in Terai, NPR 12,000 for plants installed in the Hills and NPR 16,000 for the plants installed in remote districts.	balance after completion, or full payment after completion of the scheme

FISCAL INCENTIVES

3. GoN has provided several fiscal incentives or the promotion of RETs. These incentives include tax concessions and exemptions, as detailed below:
   - Upon the recommendation of AEPC, tax exemptions are provided on machinery and instruments used for generating energy from solar, biogas, and wind resources; as well as for tubular batteries used in solar PV systems
   - Upon the recommendation of AEPC, zero VAT is levied on solar batteries produced locally
   - A concessionary 1% custom duty is applicable on the imports of machinery and parts of the following alternative energy technologies:
     - Upon the recommendation of AEPC, the non-locally manufactured equipments, parts and accessories related to micro hydro power generation, transmission, and distribution
     - Raw materials imported for manufacturing micro hydro power related equipment, parts and accessories locally
     - Wind mills including related equipment, accessories and parts
     - Solar energy equipment, parts and accessories; tubular batteries for PV systems
     - Biogas related equipments and parts and accessories
     - Import of raw materials for the production of batteries used in solar PV systems
     - Bio-stove
     - Bio-energy related equipments, parts and accessories and chemicals.

4. For small hydro power projects:
   In addition to the existing provision of income tax exemption for the first 7 years and then 50% income tax for the next three years, as per the Budget Speech 2011it is also provided that: *"Income tax will be fully exempted for the first ten years for hydro power projects commencing their construction before 24 Aug 2014 and starting commercial production before mid-April 2018. Thereafter, 50% income tax exemption for the next five years".*

Annex 5

ROYALTY PAYABLE AND INCENTIVES FOR SHP

According to the 2001 Hydropower Policy, the applicable Royalty payments are as follows.

Project capacity	Up to 15 years		After 15 years from the date of commercial operation	
	Annual Capacity Royalty, per kW	Energy Royalty, per kWh	Annual Capacity Royalty, per kW	Energy Royalty, per kWh
Up to 1 MW	-	-	-	
1MW to 10 MW	NPR 100	1.75%	NPR 1,000	10%
10MW to 100MW	NPR 150	1.85%	NPR 1,200	10%
Above 100 MW	NPR 200	2.0%	NPR 1,500	10%
For captive use	NPR 1,500	-	NPR 3,000	-

Note:

The Capacity Royalty is to be increased according to the following formula:

Capacity Royalty = (Capacity royalty rate) x $(1+0.05)^{\text{Royalty paid year - Generation licence year}}$ x (Installed capacity)

For the above Royalty to become applicable, the Electricity Act has to be amended. [57]

Some of the incentives provided to IPPs include:

- Income Tax: 0% for first 7 years for power plants commissioned by 2075 BS. Thereafter, 10% tax for the next three years. After 10 years the tax applicable will be as per prevailing corporate income tax rate, which is currently 20% in the hydro sector

  10 year full income tax holiday and 50% income tax exemption for the subsequent 5 years will be given to power plants that can achieve commercial operation by April 13, 2019 (announced during the recent 2068-69 Fiscal Budget)

[57] Once the proposed Electricity Act 2065 is ratified by parliament the royalty payment as per the Hydropower Policy of 2001 will become applicable.

Corporate income tax of 20% for SHP compared to 25-30% for other businesses

- Import of electromechanical equipment: 1% import duty and 0% VAT
- Import of steel for hydro-mechanical equipment: 1% import duty and 0% VAT.

Annex 6

STATUS OF SMALL HYDROPOWER PROJECTS

(i) Projects Completed and Operational

List of 1 MW - 10 MW Operational Small Hydropower Plant in Nepal							
Name of Company	Name of Project	Location	Capacity (kW)	Date of PPA		COD	
		(District)		BS	AD	BS	AD
NEA	Chatara	Morang	3,200				Jul-96
NEA	Panauti	Kavre	2,400			2022	
NEA	Tatopani	Magdi	2,000				
NEA	Seti	Pokhara, Kaski	1,500				1985
NEA	Puwa khola	Ilam	6,200				April, 200
NEA	Phewa	Pokhara, Kaski	1,000			2025	
NEA	Tinau	Butwal, Rupendehi	1,024				
National Hydro Power Company Ltd.	Indrawati III	Sindhupalchowk	7,500	Mangsir 15, 2054	30-Nov-97	Ashwin 21, 2059	7-Oct-02
Butwal Power Company Ltd.	Andhi Khola	Syangza	5,100	Ashadh 29, 2058	13-Jul-01		
Arun Valley Hydro Power Company Ltd.	Piluwa Khola	Sankhuwasava	3,000	Magh 9, 2056	23-Jan-00	Ashwin 1, 2060	18-Sep-03
Sanima Hydro Power Company Ltd.	Sunkoshi Khola	Sindhupalchok	2,500	Kartik 28, 2058	13-Nov-01	Chaitra 11,2061	24-Mar-05
Alliance Power Nepal Pvt.Ltd.	Chaku Khola	Sindhupalchok	1,500	Falgun 3, 2056	15-Feb-00	Ashadh 1,2062	15-Jun-05
Khudi Hydro Power Ltd.	Khudi Khola	Lamjung	3,450	Ashadh 4, 2058	18-Jun-01	Poush 15, 2063	30-Dec-06
Unique Hydel Co. Pvt.Ltd.	Baramchi Khola	Sindhupalchowk	4,200	Mangsir 3, 2066	18 Nov. 09	Kattik 28, 2067	
Thoppal Khola Hydro Power Co. Pvt. Ltd.	Thoppal Khola	Dhading	1,650	Falgun 23, 2059	7-Mar-03	Kartik 13, 2064	30-Oct-07
Ridi Hydropower Development Co. (P.) Ltd.	Ridi Khola	Gulmi	2,400	Bhadra 08, 2063	24-Aug-06	Kartik 10, 2066	27-Oct-09
Gandaki Hydro Power Co. Pvt. Ltd.	Mardi Khola	Kaski	3,100	Kartik 7, 2060	24-Oct-03	Magh 08, 2066	22-Jan-10
Khoranga Hydropower Co. Pvt. Ltd.	Pheme Khola	Phidim	999				
Hira Ratna Hydropower P.ltd	Tadi Khola	Nuwakot	5,000	Baishakh 9, 2067	22-Apr-10		
	Seti-II	Gandaki	979				
UH	Baramchi		980				
Center for Power Development and Services Pvt. Ltd	Upper Hadi Khola		991				
	Patikhola		996				
Arun Valley Hydorpower Co. Ltd.	Piluwa Khola		3,000				
Sub Total			**64,669**				

(ii) Projects Under Construction

Small Hydro Projects Under Construction (or atleast Financial Closure acheieved)							
Name of Company	Name of Project	Location	Capacity (kW)	Date of PPA		COD	
		(District)		BS	AD	BS	AD
						Remarks	
Sunkoshi Hydro Power Co. Pvt. Ltd.	Lower Indrawati Khola	Sindhupalchok	4,500	Mangsir 23, 2059	9-Nov-02		
Himal Dolkha Hydropower Compa	Mai Khola	Ilam	4,455	Chaitra 19, 2063	2-Apr-07	At completion stage	
Barun Hydropower Development Co. (P.) Ltd.	Hewa Khola	Sankhuwasabha	4,455	Ashwin 2, 2064	19-Sep-07		
United Modi Hydropwer Pvt. Ltd.	Lower Modi I	Parbat	9,900	Magh 20, 2065	2-Feb-09	At completion stage	
Synergy Power Development (P.) Ltd.	Sipring Khola	Dolkha	9,658	Magh 20, 2065	2-Feb-09		
Nyadi Group (P.) Ltd.	Siuri Khola	Lamjung	4,950	Shrawan 17, 2064	2-Aug-07		
Ankhu Khola Jal Bidhyut Co. (P.) Ltd.	Ankhu Khola - 1	Dhading	8,400	Jestha 22, 2066	5-Jun-09	At completion stage	
Bhagawati Hydropower Development Co. (P.) Ltd.	Bijayapur-1	Kaski	4,410	Ashadh 30, 2066	14-Jul-09	At completion stage	
Laughing Buddha Power Nepal (P.) Ltd.	Middle Chaku	Sindhupalchowk	1,800	Kartik 02, 2063	19-Oct-06	At completion stage	
Laughing Buddha Power Nepal (P.) Ltd.	Lower Chaku	Sindhupalchowk	1,765	-	-	At completion stage	
Alliance Power Nepal P.Ld.	Chaku	Sindhupalchowk	3,000	-	-	At completion stage	
Bhairabkunda Hydropower P. Ltd	Bhairab Kunda	Sindhupalchowk	3,000	Mangsir 2, 2065, 17 chait 2065	17-Nov-08		
Nepal Hydropower Developer P. Ltd.	Chamawati Khola	Dolakha	3,520				
Mailung Khola Hydro Power Company (P.) Ltd.	Mailung Khola	Rasuwa	5,000	Shrawan 9, 2058	24-Jul-01		
Bojini Company Private Limited	Jiri Khola	Dolkha	990	Magh 23, 2065	5-Feb-09		
Eastern Hydropower (P.) Ltd.	Pikhuwa Khola	Bhojpur	2,475	Kartik 24, 2066	10 Nov. 09		
Radhi Bidyut Company Ltd.	Radhi Khola	Lamjung	4,400	Magh 18, 2066	01 Feb. 10		
Baneshowr Hydro	Lower Piluwa		990				
Sub-Total =			**77,668**				

(iii) Projects with Concluded PPAs

PPA Concluded Projects (Financial Closure not yet concluded)							
Name of Company	Name of Project	Location	Capacity (kW)	Date of PPA		COD	
		(District)		BS	AD	BS	AD
Annapurna Group Pvt. Ltd.	Madi-1 Khola	Kaski	10,000	Mangsir 18, 2060	4-Dec-03		
East Nepal Development Endeavour (P) Ltd	Upper Mai Khola	Ilam	3,100	Chaitra 19, 2061	1-Apr-05		
Shivani Hydropower Company (P.)	Phawa Khola	Taplejung	4,950	Falgun 1, 2063	13-Feb-07		
L. K. Power (P.) Ltd.	Dapcha-Roshi	Kavrepalanchowk	5,000	Chaitra 24, 2066	6-Apr-09		
Ruru Hydropower Project (P) Ltd.	Upper Hugdi Khola	Gulmi	2,599	Ashwin 4, 2066	20 Sep. 09		
Sikles Hydropower (P) Ltd.	Madkyu Khola	Kaski	9,968	Mangsir 3, 2066	18 Nov. 09		
Baishno Devi Hydro Power (P.) Ltd.	Lower Sunkoshi -III	Sindhupalchowk	9,900	Mangsir 19, 2066	04 Dec. 09		
Radhi Bidyut Company Ltd.	Radhi Khola	Lamjung	4,400	Magh 18, 2066	01 Feb. 10		
Triyog Energy & Development Pvt. Ltd.	Middle Gaddigad	Doti	2,970	Magh 20, 2066	03 Feb. 10		
Jumdi Hydropower Pvt. Ltd.	Jumdi Khola	Gulmi	1,750	Magh 21, 2066	04 Feb. 10		
Laughing Buddha Power Nepal (P.	Middle Chaku	Sindhupalchowk	1,800	Falgun 03, 2066	15 Feb. 10		
Barahi Hydropower Pvt.ltd	Theule Khola	Baglung	1,500	Chaitra 16, 2066	29-Mar-10		
Alliance Power Nepal Pvt.Ltd.	Chaku Khola	Sindhupalchok	1,500	Baishakh 10, 2067	23-Apr-10		
Nepal Hydro Dev Co.Ltd	Charanawati Khola	Dolakha	3,520	Baishakh 13, 2067	26-Apr-10		
Api Power Company Pvt.Ltd	NauGad Gad Khola	Baitadi	8,500	Baishakh 19, 2067	2-May-10		
Energing Energineering Pvt.ltd	Upper Mailun A	Rasuwa	5,000	Ashar 25, 2067	9-Jul-10		
Swambhu Hydropower Pvt.Ltd	Upper Charnawati	Dolakha	2,020	Mansir 15, 2067	1-Dec-10		
Butwal Power Company	Andhi Khola	Syanja	4,300	Poush 7, 2067	22-Dec-10		
Ingua Hydropower Company P. Ltd	Ingua Khola	Ilam	9,700	"	"		
Joshi Hydropower Development Company Pvt. Ltd.	Upper Puwa-1	Ilam	3,000				
Adishakti	Tadi khola		970				
Nama Buddha	Tinau		990				
Gyatri Hydropower	Charanawati		980				
Garjang Upatyaka	Chake khola		990				
Eklekunda	Dorkhu khola		990				
Electro com and res	Jhyadi Khola		998				
	Dhansi Khola		955				
		Sub Total =	102,350				

Annex 7

BARRIERS TO THE DEVELOPMENT OF SMALL HYDROPOWER PROJECTS, THEIR IMPACTS AND POTENTIAL MITIGATION MEASURES

Barrier	**Cause/Impact**	**Potential Mitigation Measure**
Legal/Policy/Regulatory		
Political instability and lack of clear SHP policies	Policies can change with changes in government causing investor uncertainty	Enact laws and publish policies to reduce developer anxiety
Multiple/conflicting laws	Compliance with various laws, rules and policy is burdensome. Various ministries and agencies with sometimes conflicting rules and regulations	Laws and policies should be streamlined and a single agency should deal with project promoters
Multiple ministries involved	Long process for obtaining approvals from various ministries	Streamline approval process
Lack of policies on land acquisition	Difficulties in land acquisition and resettlement issues discourage development of SHP. GoN's involvement and support is minimal which leads to costly land acquisition	Government needs to develop clear policy on land acquisition
Short license period	The license period is 35 years which is inadequate for IPPs to hedge against generation uncertainties and improve profit margins	Evaluate impacts of increasing license period to 50 years
VAT policy	VAT is considers to be too high by IPPs	Evaluate impact of reduce VAT to zero for qualifying projects
Institutional		
Lack of Project Development	DOED does not sign PDA	Draft PDA should be developed for

Barrier	Cause/Impact	Potential Mitigation Measure
Agreement	with SHP developer exposing them to risks associated with change in laws over the life of the project	SHP and DOED should sign PDA
DOED as project developer	DOED as the regulator should not be in the business of developing projects and competing with IPPs	There is a conflict of interest in the regulator developing projects. If not NEA, another agency should be established to develop GoN projects
Weak capacity of DOED IPP, and other stakeholders	The capacity of developers to develop and implement good proposals is weak	Training and capacity building and awareness of project development and bank due diligence process should be provided
Financial		
Banks face a liquidity crunch	Bank lending to hydropower is low due to liquidity issues. Interest rate is too high and loan tenor is short. Presently banks provide variable rate short tenor loans – typically 8-10 years at 14-16%	Bank liquidity and ability to raise lower cost financing should be improved through credit lines, Funds, access to Forex mitigation instruments, etc.
No project finance available in Nepal	Term loans are made against collateral and personal guarantees limiting developer ability to finance projects	Capacity of IPPs and banks should be developed to qualify for project finance
IPPs are unable to raise required equity	IPPs are unable to raise equity of 20-30% required by many Funds and making project finance difficult	Fund structure should be developed with a clear understanding of the market situation in Nepal.
Corporate Social Responsibility	Project developers are sometimes required to provide access roads, establish hospital and school for local communities which drives up project costs	CSR should be encouraged but IPPs should be able to generate a return on their investment through improved purchase price
Single off-taker of power	NEA is the only off-taker of power. Projects cannot be developed if NEA refuses to sign a PPA for power purchase during the wet	Consider open access markets which will allow IPPs to negotiate direct domestics sales. Clear power wheeling mechanism and greater access to export markets would also

Barrier	Cause/Impact	Potential Mitigation Measure
	season. NEA is not required to buy all available IPP power	help
Low power purchase price	The PPA price is too low according to IPPs and does not offer an adequate return on investment	Prices were recently raised by 20% but the price escalation was reduced thus lowering overall benefits. Evaluate impact of further improving purchase price
Currency risks	IPPs are paid in NRs and thus are unable to raise capital in foreign markets at low rates	Hard currency risk mitigation instruments are required to allow hard currency borrowing
Off-taker of power is not creditworthy	NEA is not a creditworthy off-taker of power which could make bank financing difficult and/or expensive	In the absence of sovereign guarantees, projects may need PRG and PCG allowing them to access lower cost financing. But banks and IPPS are presently taking the risk
Transmission right-of-way not easy	Obtaining right-of-way is not easy and land acquisition is costly often at above NRs. 1 million per Roppani (5476 sq ft)	Assist IPPs with transmission access and land acquisition
No credible EPC contractors	Nepal does not have credible EPC contractors who can assume project construction risks. The absence of EPC contracts make project finance difficult	It may be feasible for IPPs to have multiple EPC contracts in place of a single EPC contract. EPC contracts may be feasible for specific materials and services – electro-mechanical, civil works, turbines, etc.
Lack of risk insurance	IPPs are unwilling to purchase insurance to mitigate risks making project finance difficult	Risk insurance instruments should be made available at relatively low cost
Commercial bank lack liquidity for hydropower development	No single commercial bank in Nepal has the ability to finance beyond 1 MW on a single project, and syndicated loans with multiple banks is the only option	Make credit lines, PRG, PCG, Funds and other financing and mitigation instruments available
Technical		

Barrier	Cause/Impact	Potential Mitigation Measure
Lack of transmission capacity	Lack of transmission capacity in remote areas is constraining hydropower development	DOED licensing process should be matched with NEA transmission expansion plans. More financing required to expand transmission grid
Low load factor of hydropower projects	Low load factor of hydropower reduces firm power and plants have low output during the dry season when power demand is high	Balance power system with reservoir based projects to mitigate low load factor risks
Country/Political Situation		
Poor law and order situation in the country	Poor law and order situation requires additional security adding to project costs	Improve project security and provide IPPs with adequate return on investment
Explosives for civil construction	Only army is allowed to handle explosives required during civil construction, which delays projects and adds to the cost	Consider relaxing procedures for IPP to purchase and handle explosive for civil construction
Environmental		
Onerous environmental policies	Even BOOT IPP projects are required to purchase compensatory forest land	This policy is not clear given that the project land is transferred back to the GoN at the end of the lease period

Annex 8

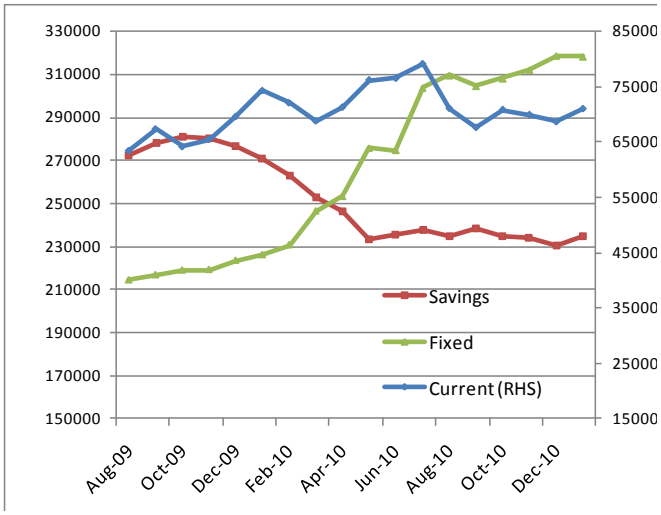
ISSUES ON SMALL HYROPOWER PROJECT FINANCING

1. Financing for SHP is a critical barrier to greater development of SHP in Nepal, and some of the key elements of this financing barrier are summarised in Section 4.3 of the Investment Plan. This note elaborates on some of the principal financing barriers to the scale up of SHP in Nepal.

2. Financing Gap Risk for Lenders

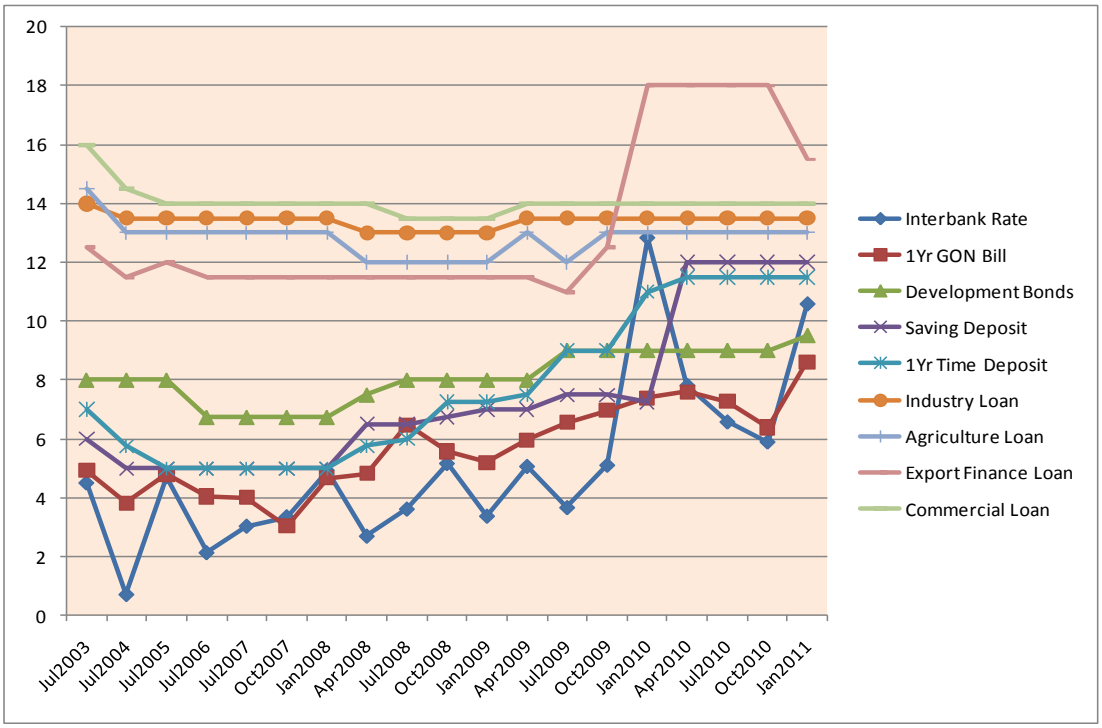
Insufficient supply of long term financing, whether to local banks as credit intermediaries or directly to SHP projects from traditional sources of long term credit (pension, insurance, and local bond capital market) is the predominant barrier to financing and scaling up of SHP projects. The Nepalese Commercial Banking sector is the primary credit intermediation mechanism and the pension and insurance sector has traditionally provided funds to banks rather than directly to projects. However, the Commercial Banks in Nepal rely largely on deposits, which are 1-Year or less to fund their loan books, introducing significant funding gaps when SHP project loans of 10-15 years are considered. The pension and life insurance markets are thus the main source for institutional demand for term funding for banks. Consultations with these market participants confirmed their interest in extending tenors for banks; however, the interest rates required for such term deposits were in excess of 12% per annum and considered too high by the banks. There is not a well-defined term structure for long-term rates in Nepal, but it appeared that such a rate was approximately 3-4% above the 1-Year GoN T-Bill rate. Due to the twin problems of high inflation imported via the pegged exchange rate and a credit crunch in Nepal which has given way to a liquidity crunch, the commercial banking sector has experienced significant withdrawals of savings deposits and flights to quality on fixed deposits from smaller banks (Figure A8-1) which, according to Commercial Bank stakeholders consulted during the Joint Mission, has continued into July 2011. Market interest rates for banks have soared which in turn has caused lending rates to do so as well. As seen in Figure A8-2 below, in January 2011, the 1-Year interbank rate was over 10% and commercial lending rates were approximately 14%. During consultations with market participants in July 2011, lending rates were approaching

Figure A8-1: Commercial Bank Deposit Base in Nepal to Jan 2011



17%. The funding problem was further aggravated by the announcements of various GoN sponsored infrastructure financing initiatives such as People's Hydro and the Hydropower Development and Investment Corporation. Although the funding plans for these initiatives are not yet clear, market participants indicated that the pension and insurance institutional investors were withdrawing additional bank deposits and shifting purchases to 5-Year Development Bonds being issued to fund the abovementioned hydropower initiatives (source: Nepal Investment Bank).

Figure A8-2: Interest Rate Indices in Nepal



3. **Forex Risks**

The total development costs of SHP projects in Nepal invariably include material "external costs" due to the need to source equipment and contracting services from overseas (less the case for micro-hydro). For larger SHP projects, the overseas development costs can exceed 50% of the total development costs. Based on the interest rate differentials between NPR and the major foreign currencies, there is significant foreign exchange pressure on the NPR-INR peg and the risk of devaluation is high. Lenders must mitigate or transfer this risk or face large cost overruns, which could undermine the creditworthiness of the SHP project.

4. **Financial Restructuring Risks due to Inadequate Feasibility Studies**

Consultations with banks and IPPAN members indicated that numerous initial feasibility studies conducted by or on behalf of SHP developers made optimistic hydrology assumptions, which translated into higher expected cash flow generation than actually realized. Additional sources of modeling error are from technical losses, generating asset availability, construction and maintenance cost budgeting, and grid connection delays. Subsequently, numerous SHP financing loans required maturity

extensions and waivers. Such restructuring activity causes the lenders to post additional loss reserves and curtails lending to the SHP sector. Feasibility studies should be carried out in compliance with lender requirements to ensure that projects are not over-leveraged.

5. Preservation of Generating Asset Economic Life

Lack of adequate assurances that equipment, parts, asset servicing and repair are available to maintain the availability and preserve the projected economic lives of the SHP generating assets. Such factors as well as load balancing and interconnection/evacuation can have a significant effect on the economic lives of the generating assets. These represent material risk factors to lenders that provide long term debt financing to such projects.

6. Rights of Way, Community, and District Issues for SHP Financing

Consultation with developers has indicated that community disputes are not only a key driver and risk factor during the licensing and construction phase for SHP projects, but continue to be a risk factor during the operational phase as well. During the dry months, water access rights are sometimes ignored by local communities who require water for irrigation and commercial uses. There is anecdotal evidence that indicates communities also employ such measures to renegotiate terms with SHP developers to obtain additional concessions beyond those negotiated during the development phase of the projects. Rights of Way issues also arise with penstock installations and transmission lines critical to SHP development. Such delays can erode the equity base of the project and expose the lenders to default by the developer due to cost overruns.

7. Availability of Equity and Mezzanine for SHP Developers

Consultation with banks and SHP developers has indicated that developers are often insufficiently capitalized to provide the 30% equity required by lenders. Developers have resorted to raising equity in the local equity market by listing with the Nepal Stock Exchange, to stretching the financing component by providing additional collateral and personal guarantees, and to lowering the cash equity requirement by contributing over-invoiced assets and attempting to avoid fixed or guaranteed maximum price EPC contracts to lower the development costs and assume more project risks. Given the long tenors of the licensing agreements, a mezzanine debt component may be feasible to increase the subordinated capital cushion for the lenders.

8. NEA & PPA Issues

The creditworthiness of the NEA and the terms of the NEA Standard PPA present material risks to SHP project lenders. The NEA is facing the risk of a liquidity event with its negative net current assets of (32.16) billion NPR (Source: NEA Annual Report 2011). Furthermore, when considering its ongoing operating losses and its obligations to develop transmission lines in respect of certain of its PPA's, the NEA is at risk of approaching technical insolvency. Although the NEA does not carry any explicit government support from GoN, the prevailing view among the financial sector and IPP developer respondents during the Joint Mission was that the GoN would not risk the financial and social adverse effects of an NEA default on PPA payments. However, any GON support would likely introduce appropriations risks

and timing delays that could erode the equity base of SHP projects and lead to debt default. Furthermore, the NEA can also default on performance obligations such as with enabling grid connectivity and providing power transmission lines. There are numerous cases of delays from NEA performance default and a large percentage of potential SHP projects have such NEA performance risk (mainly transmission line requirements) and risk being deemed "not viable" by lenders. This problem is further aggravated by the terms of the NEA standard PPA, which provides inadequate compensation under NEA default scenarios. The penalties for the NEA amount to only 5% assessed on the Contracted Energy which itself is typically lower than the generating capacity of the underlying assets. Furthermore, in the event of an IPP default, termination of the PPA does not have adequate provisions to cover the lenders exposure. Although any successor buyer of the project must assume the PPA, there doesn't appear to be provisions for the assumption of existing debt. Hence, lenders need to rely on step-in rights and strong surveillance in order to mitigate this risk.

9. Legal and Enforcement Issues for SHP Financing

In order to develop a Project financing market for SHP, secured financing structures are required to give adequate assurances that lenders would be secured by the cash flows, assets, and contracts underlying project. Ordinarily in more developed legal systems, Special Purpose Entity or Trust law is utilized to set up specialized, bankruptcy remote financing vehicles to isolate such collateral beyond the reach of the developer's bankruptcy estate in the case of insolvency. Nepal lacks such legal structures and does not have a Trust law per se. Nepal does have a Securitization law allowing for security interests over various forms of collateral (modeled in part based on the Uniform Commercial Code in the USA. However, Nepal does not currently have a registry for perfecting such security interests, which introduces the risk of double pledges of collateral. Together, these issues introduce enforcement and repayment timing risks to lenders who may be subject to insolvency proceedings and lack of a truly perfected security interest in the collateral.

10. Insurance Market Issues

Local Insurance markets exist for SHP projects and are supplemented with reinsurance capacity from offshore reinsurance companies. The available insurance markets cover mainly the development period and consist of Contractors 'All-Risk''policies which cover a broad set of risks as well as some policies for post-operations. However, the terms of such policies are short relative to the project development and operational tenors. This is due to the reinsurance market being generally on a 1-Year renewable term basis. The policies provided to the SHP projects therefore tend to be for 1 Year.

Annex 9

CAPACITY OF FINANCIAL INSTITUTIONS

1. The size and structure of Nepal's financial sector indicates that, subject to adequately mitigating the various barriers to financing SHP projects in Nepal, local funding sources are available to leverage the SREP funds to meet the financing requirements of the representative SHP opportunity pipeline and thereby allow SREP to provide a transformative impact as required by the SREP donors.

2. Table A9-1 below provides the composition of the financial sector in Nepal and indicates that the commercial banking sector is the largest asset gathering and credit intermediation market in Nepal and therefore warrants the most attention. The Development Banks, although substantially smaller, have deposit taking and lending capabilities similarly to Commercial Banks (their Class B charter prohibits them from the letter of credit business lines) and, therefore, can be expected to participate in senior, mezzanine and asset management roles for any SHP financing initiatives alongside the Commercial Banks.

3. Among the other financial sectors, several are not oriented toward commercial and industrial exposures such as Finance Companies, Micro-Credit institutions and Cooperatives who lend primarily to the consumer sector. The pension and insurance sectors, especially in more developed markets, are a choice investor base for long duration assets such as SHP project loans. However, in Nepal, the pension and insurance sector is mostly invested in GoN instruments and in shorter term bank deposits and have, therefore, not entered the credit markets as significantly as in more developed country markets. For example, the Provident Fund Corporation, the Employees Provident Fund, and the Citizens Investment Trust are largely invested in member loans, bank deposits (typically one year or less), and GoN instruments such as T-Bills and Development Bonds (direct GoN obligations, typically 5 years, and largely used by financial institutions to maintain Statutory Liquidity Ratios (SLR) as per NRB regulation). This is also the case with the Life insurance companies whose investment portfolios are restricted by local regulations. The Pension and Insurance financial institutions are expected to participate in any SREP initiative by mobilizing funds to support longer term financing to the banking sector. The remaining financial sector participants have insufficient asset size to warrant being a primary source of financing for SHP initiatives.

4. Another source of SHP financing in developing countries is the local capital markets; however, in Nepal the local bond market is inadequately developed, except for GoN T-Bill, Note, and Development Bond issuance. Although the Nepal Stock Exchange has the infrastructure for the listing and trading in corporate debentures, local demand, and therefore issuance, has not been a material source of term financing for SHP. Rather, SHP developers have used the Nepal Stock Exchange to IPO shares of their development companies in order to raise equity capital and/or divest a portion of their holdings.

Table A9-1: Nepal Rastra Bank Reporting Financial Sector
(Source: Nepal Rastra Bank: "Quarterly Economic Bulletin", vol 45, Jan 2011)

	Number	Asset Size (NPR million)
Commercial Banks	30	793,747
Development Banks	87	125,709
Finance Companies	79	123,688
Micro-Credit Dev Banks	21	Unavail
Cooperatives (NRB)	16	Unavail
NGO's (NRB)	45	Unavail
Insurance Life*	8	43,451
Insurance Non-Life*	17	10,192
Nepal Industrial Development Corp	1	1,260
Agricultural Development Bank	1	25,526
Provident Fund Corporation	1	34,464
Deposit Ins & Credit Gty Corporation	1	494
Employees Provident Fund*	1	99,764
Citizens Investment Trust	1	24,415
** Predominantly Bank Deposit and GON exposure*		
Total		1,282,710

5. Commercial Bank Market

Table A9-2 below provides more detail on the Commercial Bank sector in Nepal. Although the aggregate domestic credit provided by the Commercial Bank sector is substantial relative to Nepal's SHP financing needs, the actual credit availability and extensions to SHP from the Commercial Bank market has been limited due to a number of contributing factors. Firstly, the Commercial Bank market is funded primarily on a short term deposit basis and therefore more inclined, for risk management and commercial reasons, to provide shorter term facilities with one to three year durations to industrial and commercial enterprises with higher turnover and shorter term receivables as collateral. SHP loan underwriting indicate that longer term, approximately 15 year, amortizing loan structures are needed to fully repay debt presenting a large financing gap risk to the banks. Secondly, the banks have numerous other risk factors to mitigate in any SHP underwriting. As a result, the banks focus on overall asset quality and require additional developer resources and personal guarantees (which are often joint and several among the developer shareholders), which introduces additional selectivity that is not based on the merits of the underlying SHP project. Thirdly, as per regulatory guidelines, the

banking sector is subject to single corporate obligor and sector exposure limits. Of these, the single obligor limit is the most constraining. Single corporate obligor Limits are 50% of core capital (Tier 1). Banks currently are targeting around 25% due to liquidity and credit risk concerns. On an aggregate basis, the Commercial Banking Sector has approximately NPR 50 billion in paid-up capital. Although the Tier 1 core capital component is not separately reported, bank sector participants indicate that NPR of 300-400 million had been the typical exposure taken by lead banks due to the single obligor limits. Currently, lead banks and participating banks in SHP financing syndicates are committing NPR 100-200 million such that increasingly larger bank syndicates are needed to fund an SHP project. As an illustration, assuming uniform NPR 150 million commitments from each syndicate member, a total of 11 banks; that is, a 36% local Commercial Bank participation rate, would be required to finance a 1.0 MW project.

Table A9-2: Nepal Local Commercial Bank Sector Highlights (Sept 2010)

NPR Millions	Deposit Base	Total Assets	Liquid Investments	Liquidity Ratio	Loans	Private Sector Loans	%-Deposit Base	%-Total Loans	Shareholder Capital
RBB	62,343	81,225	11,717	19%	33,140	32,085	51%	97%	(9,955)
ADBL	31,267	60,786	4,717	15%	39,311	38,449	123%	98%	8,976
NIBL	49,421	59,689	6,467	13%	41,908	40,478	82%	97%	3,918
NABIL	46,746	55,690	3,673	8%	33,769	32,869	70%	97%	4,269
NBL	40,515	53,996	13,449	33%	25,412	25,237	62%	99%	(4,495)
HBL	37,891	45,662	3,916	10%	30,034	30,034	79%	100%	3,949
NSBI	38,828	43,606	4,863	13%	18,089	17,199	44%	95%	2,534
EBL	37,160	42,776	5,578	15%	27,856	23,857	64%	86%	2,759
SCBNL	34,667	41,164	5,777	17%	17,383	17,136	49%	99%	4,139
BOK	19,815	23,793	2,290	12%	16,450	15,937	80%	97%	2,074
SBL	19,730	23,661	3,134	16%	16,686	16,686	85%	100%	1,956
KUMARI	17,356	21,983	3,679	21%	14,786	14,658	84%	99%	1,625
MBL	18,113	21,744	2,883	16%	15,037	14,562	80%	97%	1,829
NICB	16,002	20,925	2,345	15%	13,050	12,758	80%	98%	2,372
PRIME	16,892	20,311	2,408	14%	15,177	14,495	86%	96%	1,499
LAXMI	16,435	20,106	1,717	10%	14,729	14,281	87%	97%	1,913
KIST	15,994	19,125	2,621	16%	12,682	12,647	79%	100%	2,186
GLOBAL	14,859	18,104	2,324	16%	12,751	12,408	84%	97%	1,745
SUNRISE	13,665	17,076	1,894	14%	12,225	11,898	87%	97%	1,981
NBB	10,054	16,482	1,434	14%	9,008	8,636	86%	96%	2,434
CITIZENS	13,077	16,242	2,411	18%	11,122	10,972	84%	99%	1,308
BOA	12,790	15,907	1,336	10%	11,404	11,144	87%	98%	1,585
NCCB	10,853	14,839	1,149	11%	8,585	8,212	76%	96%	1,730
NMB	9,831	13,388	1,512	15%	7,652	7,185	73%	94%	1,661
DCBL	8,073	10,770	1,516	19%	7,597	7,577	94%	100%	2,033
LUMBINI	5,706	8,022	1,117	20%	5,328	5,328	93%	100%	1,456
Mega	1,618	3,863	944	58%	2,075	2,075	128%	100%	1,700
Janata	1,054	2,802	1,221	116%	1,229	1,229	117%	100%	1,468
	Deposit Base	Total Assets	Liquid Investments	Liquidity Ratio	Loans	Private Sector Loans	%-Deposit Base	%-Total Loans	Shareholder Capital
Aggregate	620,755	793,736	98,096	16%	474,474	460,030	74%	97%	50,650

Annex 10

INVESTMENT CONCEPT BRIEF: SMALL HYDROPOWER

Concept Paper on an SHP Structured Facility for Leveraging of SREP Funds by the Private Sector

I. Problem Statement

1. According to the DOED, there are more than 635 unique SHP Developers (1MW up to 10MW) in Nepal, representing approximately 3,300 MW in SHP projects that are potentially in need of financing. Identifying and supporting the subset of financially viable SHP projects from this list requires significant resources and risk underwriting skills. Furthermore, the capital intensity and duration of such SHP projects require long term project financing solutions which increases the perceived and actual risks faced by capital providers.

2. The Nepalese financial sector, dominated by the Commercial Banks, Pension, and Insurance companies have funds which can be mobilized to support a scaling-up of SHP development, but there remain significant financial barriers to mobilizing such funds, including i.) lack of sufficient long term financing on acceptable terms and interest rates; ii.) insufficient means of attracting participation of the pension and insurance sectors; iii.) exposure limits of Commercial Banks; iv.) inconsistent risk underwriting practices; v.) under developed local debt capital markets; vi.) inability to mitigate Foreign Exchange risk. The international capital markets have significant depth, appetite, and expertise to provide long term financing, but employ high standards for risk underwriting due to the lack of local knowledge required to structure and service SHP Project financing commitments. A solution is required for scaling-up SHP financing by deploying funds to build financing capacity and to mobilize private sector funding sources. Such a solution would combine the strengths and comparative advantages of local and international capital providers, such as the MDB's, to structure a platform for private capital and public/donor capital to work in partnership.

II. Proposed Contribution to Initiating Transformation

3. SREP funds will be utilized to develop a SHP structured facility (the "SHP Structured Facility") which leverages SREP funds by crowding-in the private sector to support the SHP financing activities of pre-selected Nepalese Credit Institutions ("Partner Banks") *(pre-selected by MDBs based on their selection criterion).* Capital commitments from the SHP Structured Facility to the Partner Banks would be designed to mitigate financial barriers faced by the Partner Banks by deploying innovative capital and risk-sharing solutions including but not limited to: Credit Facilities, Risk-Sharing Facilities/Guarantees, and Foreign Exchange and Interest Rate Risk Coverage Facilities/Guarantees.

4. SREP funds will be utilized to provide Technical Assistance in the form of advisory services and assistance in capacity building, SHP market information sharing, and developing SHP project financing expertise. SREP funds may be utilized to provide equity or mezzanine capital for eligible SHP Developers which have technically feasible and financially viable SHP projects but lack the necessary capital to meet the financing requirements of the Partner Banks.

5. The SREP-supported SHP Structured Facility will attract available sources of long term finance such as from the Pension and Insurance sectors and increase the aggregate amount of long-term financing available for SHP projects. The combination of capital, risk sharing solutions and technical assistance will demonstrate the viability of SHP project financing, promote financial intermediation for SHP, and provide SHP financing business models which can be replicated in Nepal.

III. Implementation Readiness

6. The potential demand for SHP financing is vast and SHP project pipelines of 100MW have been identified with relative ease. The Nepalese financial sector is highly constrained due to liquidity pressures and insufficient capital sources and is openly in demand of long term financing and risk-sharing solutions. The imbalance of supply and demand for long term SHP financing in Nepal is reaching crisis proportions. The MDB's have identified several candidate Partner Banks and have held numerous discussions on their existing SHP lending activities and needs.

IV. Rationale for SREP Financing

7. The significant demand/supply imbalance for long term financing has become a major barrier to scaling-up SHP development in Nepal which necessitates interventions by the MDB's with SREP co-financing.

8. The global financial crisis has led to limited liquidity and ability by local Commercial Banks to provide long-term financing for SHP projects. The SREP co-financed SHP Structured Facility will rectify this market dislocation by providing a platform to build financing capacity and to mobilize private sector funding sources to bring innovative financing solutions to the SHP sector. This will facilitate development and scaling-up of SHP development in Nepal.

	SHP Structured Facilities	
	ADB (US MM)	IFC (US MM)
Technical Assistance Grant	500,000	500,000
Total TA Grant	**500,000**	**500,000**
SREP First-Loss Participation	9,500,000	9,500,000
MDB Private Sector Window	20,000,000	20,000,000
Senior Participation Investors	10,000,000	10,000,000
Total SHP Structured Facility	**39,500,000**	**39,500,000**

9. The SREP co-financed SHP Structured Facility will provide systemic support to the Nepalese banking sector to enhance its ability to finance SHP investments and demonstrate the viability of project financing solutions for SHP. The success of the SHP Structured Facility will attract additional capital and resources from the private sector.

V. Financing Plan

10. The financing plan for the SHP Structured Facility is shown in the Table below. The SHP Structured Facility will be funded by SREP funds providing a first-loss capital layer (the "SREP Participating Loan") above which the MDB's would commit a pro-rata share of additional financing capacity. Each MDB would raise additional capital from local financial institutions, such as Pension and Insurance companies, either on a senior basis or pari-passu with the MDB as local market appetite is developed.

	No Mezzanine USD (MM)	15% Mezzanine USD (MM)
Senior Investors	20	20
ADB/IFC	40	40
SREP	19	19
Total Debt Funds	79	79
Project Equity (30%)	34	14
Total Sources	113	93
SREP Leverage	**5.64x**	**4.65x**
(Total Sources/SREP Funds)		
Project Leverage	**3.33x**	**6.67x**
(Total Sources/Project Equity)		

11. The SREP Participating Loan would be structured as a non-interest bearing participation in the SHP Structured Facility upto the amount of USD 19 million Additionally, USD 1 million

would be provided to the SHP Structured Facility for Technical Assistance grants. Each MDB will be allocated 50% of the SREP funds for the following intended uses: i.) USD 9.5 million: SHP Structured Facility participating loan; and ii.) USD 0.5 million: Technical Assistance grant. IFC and the private sector windows of the ADB would then procure capital commitments from their respective institutions to participate in the SHP Structured Facility Each MDB would also have the option to raise additional funds from local financial institutions, in the form of senior participating loans in its SHP Structured Facility The participating loans of each MDB and any senior investors would be interest bearing based on a market pricing of the risk inherent to the respective SHP Structured Facility exposures. SREP funds for mezzanine lending to SHP Projects is not considered at this stage, but may be revisited during the implementation phase.

12. As an illustration given in the Table, if each MDBs procures USD 20 mn as capital commitment from its respective institutions and an additional USD 10 million each in the form of senior participating loans in its SHP Structured Facility, the leverage of the SHP Structured Facility exceeds the 4:1 SREP guidance, as measured by the total capital sources for SHP mobilized by the SREP donor funds. Furthermore, to the extent that any SREP funds are used to provide subordinated capital to SHP Projects, the financial leverage as measured by the Project equity capital would be augmented. The realized leverage of the SHP Structured Facility when implemented is subject to change and highly dependent on several factors such as the investment committee requirements of each MDB, the investment appetite of local financial institutions, the financial strength of the Partner Banks, and the viability of their SHP Project target portfolios.

VI. Project Preparation Timetable (Estimated)

Estimated Project Preparation Timetable		**6.25** Working Months
Duration	**Sequential**	**Description**
2 Weeks	✔	Country Risk Assessment
3 Weeks		Whitepaper: Capital and Risk-Sharing Solutions
2 Weeks		Selection of Partner Bank Candidates
3 Weeks	✔	Due Diligence of Partner Bank Candidates
3 Weeks	✔	Review of SHP Project Pipelines
2 Weeks		Market Pricing and Risk Management
4 Weeks		Capital Commitments Committee Process
8 Weeks	✔	External Capital Raising
4 Weeks		Execution of SHP Structured Facility

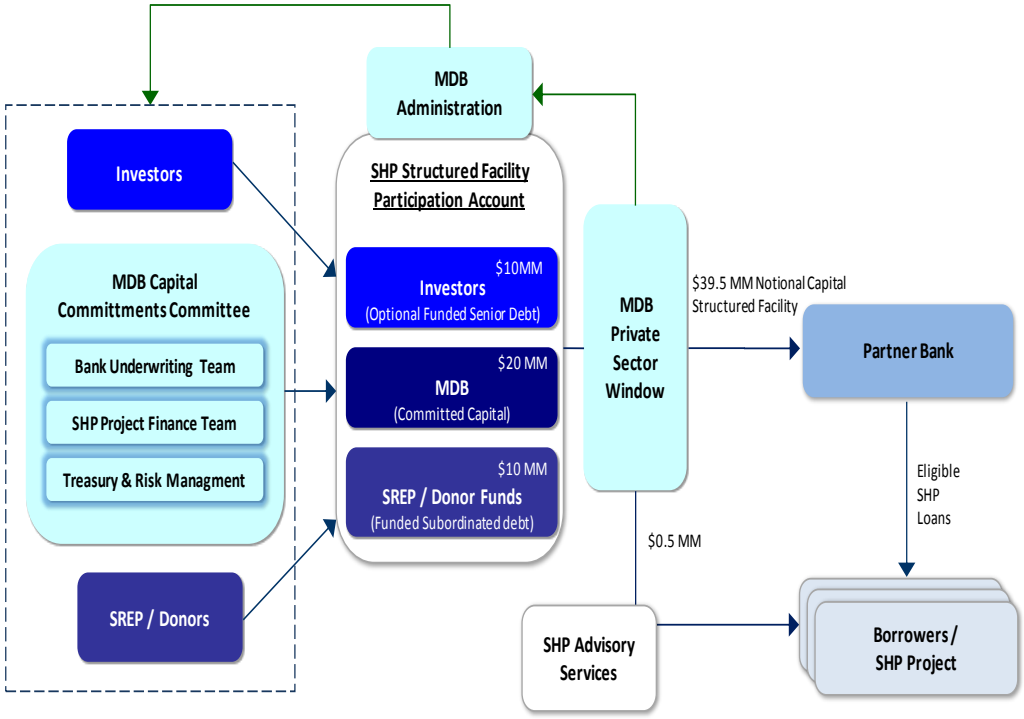
Note: The above table is subject to timely approvals from each MDB's respective management and Board. Also, above timetable assumes normal capital markets scenario and cooperation from the proposed partner banks and project developers

Annex 11

SHP STRUCTURED FACILITY INVESTMENT ALTERNATIVES FOR PARTNER BANKS

1. This Annex provides more detailed implementation and investment alternatives for the recommended SHP Structured Facility. The SHP Structured Facility allows for a flexible execution by the MDB's. For example, the SHP Structured Facility could be implemented on the balance sheet of each MDB or as a segregated account at the MDB or alternatively as a legally segregated special purpose fund. In each case, the MDB would perform the role of fund manager and administrative agent. Each such embodiment of the SHP Structured Facility has its benefits: the on-balance sheet or segregated account implementation provides ease of execution while preserving the preferred creditor status of the MDB; whereas the segregated fund entity provides a robust platform for future private capital contributions to further leverage the facility. The segregated account structure is assumed as the preferred initial execution of the MDB structured facility as shown in Figure A11-1. The private sector windows of each MDB would serve as the origination and execution focal point for each Partner Bank facility. The private sector windows would coordinate the internal resources to take the SHP Structured Facility to their respective capital commitments committees and to originate, negotiate, and consummate each Partner Bank facility.

Figure A11-1: Illustration of SHP Structured Facility Implementation



2. The allocations and intended use of SREP funds to SHP and the sub-allocations to each of the MDB's are shown in Table A11-1. SREP funds in the amount of USD 20 million are allocated to scale-up SHP in Nepal. Each MDB is then allocated 50% of the SREP funds for the following intended uses: i.) USD 19 million as a participating loan to the SHP Structured Facilities; ii.) a Technical Assistance grant of USD 1

million. SREP funds for mezzanine lending to SHP Projects is not considered at this stage, but may be revisited during the implementation phase.

3. Please change the numbers in the figures. Also, what is national/notional capital structure find – it is not clear

Table A11-1: SREP Allocations to MDB's for SHP Structured Facility Implementation

	SREP SHP Allocations	MDB Sub-Allocations ADB	IFC
Total SREP Allocation to SHP	**20,000,000**	50%	50%
Grant: Technical Assistance	1,000,000	50%	50%
SHP Structured Facility Participation	19,000,000	50%	50%
SHP Project Mezzanine Fund	-	50%	50%

4. An illustrative use and leveraging of the SREP funds by each MDB's SHP Structured Facility is shown in Table A11-2. The USD 9.5 million in SREP funds designated for the SHP Structured Facility would be in the form of a non-interest bearing participating loan to the SHP Structured Facility. The private sector windows of the MDB's would then procure capital commitments from their respective institutions (assumed as USD 20 million from each institution for illustration purposes). Each MDB would then also have the option to raise additional funds from financial institutions, in the form of senior participating loans in its SHP Structured Facility to bear losses in excess of the respective MDB's participating loan (assumed to be $10m). The participating loans of each MDB and any senior investors would be interest bearing based on a market pricing of the risk inherent to the respective SHP Structured Facility exposures. The Technical Assistance grant funds would be deployed by each MDB based on the activities of their respective SHP Structured Facility.

Table A11-2: Illustrative Sizing of MDB SHP Structured Facility Implementation

	SHP Structured Facilities ADB (US MM)	IFC (US MM)
Technical Assistance Grant	500,000	500,000
Total TA Grant	**500,000**	**500,000**
SREP	9,500,000	9,500,000
MDB Private Sector Window	20,000,000	20,000,000
Senior Participation Investors	10,000,000	10,000,000

5. The SHP Structured Facility investments in the Partner Banks may take the form of either participations in the underlying SHP Project Loans or contingent debt capital for the Partner Banks when project loan losses create funding pressures. In addition, the SHP Structured Facility can be used to support different stages of the SHP project loans; namely the permanent financing stage versus the construction financing stage. The MDB's have developed numerous risk underwriting and financing products to support development financing such as for SHP Projects in Nepal. These tools have been developed to address a broad array of risk factors such as project risks, credit, foreign exchange, liquidity, and political risk factors. The purpose of the SHP Structured Facility is to provide each of the MDB's with a pre-determined capital base (as shown in Figure A11-1) from which to structure and provide capital and risk-sharing solutions to the Partner Bank's for their SHP Project financing needs. Some of the capital and risk-sharing solutions available to the MDB's can be generally categorized as:

6. <u>Credit Facility/Debt facility</u>

Solutions in this category generally provide the Partner Bank with debt capital, whether funded up-front or provided as a committed credit facility, to finance its SHP debt portfolio. Such debt may be provided on an unsecured or secured basis. When provided to the Partner Bank as a committed credit facility, the SHP Structured Facility may allow conditional draws on the facility by the Partner Bank based on the performance of the Partner Bank's conditional SHP debt portfolio.

7. <u>Risk Sharing Facility/Guarantees</u>

Solutions in this category would generally expose the SHP Structured Facility to the underlying SHP Project loans of the Partner Banks. When executed in Guarantee form, the Partner Bank would fund the SHP Project exposure and receive a guarantee by the SHP Structured Facility to cover a portion of the losses on the SHP exposure.

8. <u>Foreign Exchange Risk Cover Facility</u>

Solutions in this category generally cover market risk contingencies such as foreign exchange risk inherent to the Partner Bank's exposures in its SHP loan book. For example, the Partner Bank may secure hard currency financing on acceptable terms but requires a foreign exchange hedge to cover its liability since its SHP loan portfolio is NPR-denominated. The SHP Structured Facility may provide a partial foreign exchange hedge or financing to cover losses on the Partner Banks foreign exchange exposure.

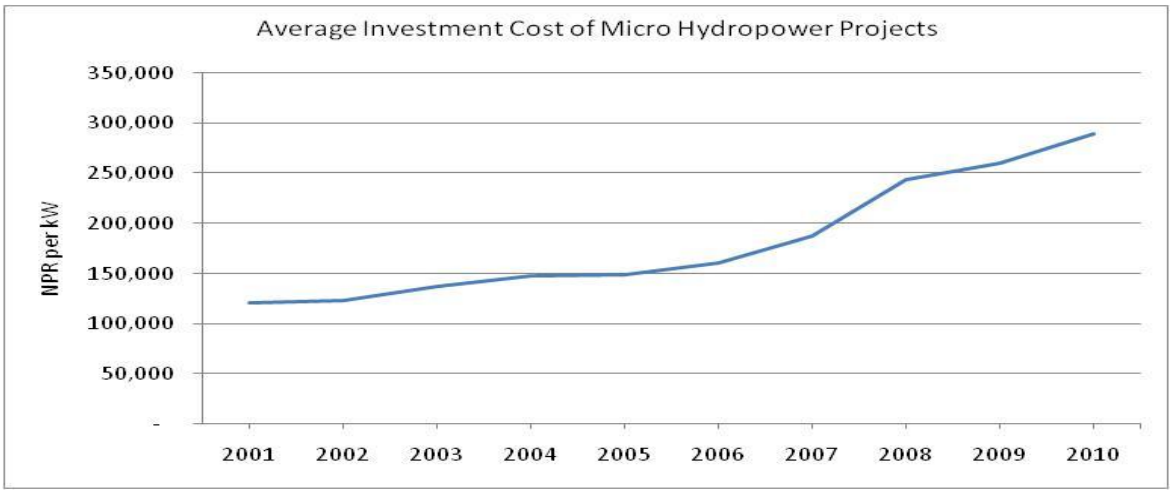
9. The MDB's would embed one or more of such solutions into each facility with the Partner Banks.

Annex 12

COST ESTIMATES FOR INVESTMENT PLAN

1. Small Hydropower Projects

2. Mini and Micro Hydropower Projects

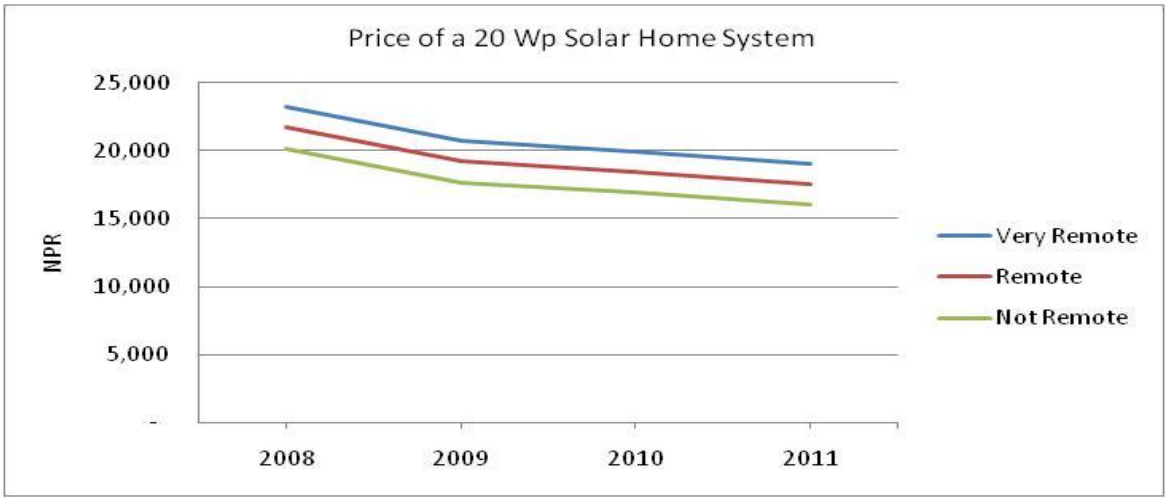


As seen from the above cost curve (data source: AEPC) the average investment cost of a micro hydropower project has increased over the years and reached NPR 289,593/kW in 2010. Possible reasons for the increase include commodity price increases, domestic inflation and the need to venture further afield to reach the more remote communities.

Reliable cost figures are not available for mini hydropower projects. Further, projects in this range (100 kW – 1 MW) have not been popular as they tend to be too large for small, dispersed communities, but not large enough to be economically connected to the national grid.

Hence, the bulk of the mini and micro hydropower projects under SREP are expected to be in the micro category. Further, the rising trend in unit prices is expected to ease somewhat with capacity building, volume growth and competition. Accordingly, a figure of NPR 320,000/kW (USD 4,444/kW) has been assumed in the SREP Investment Plan.

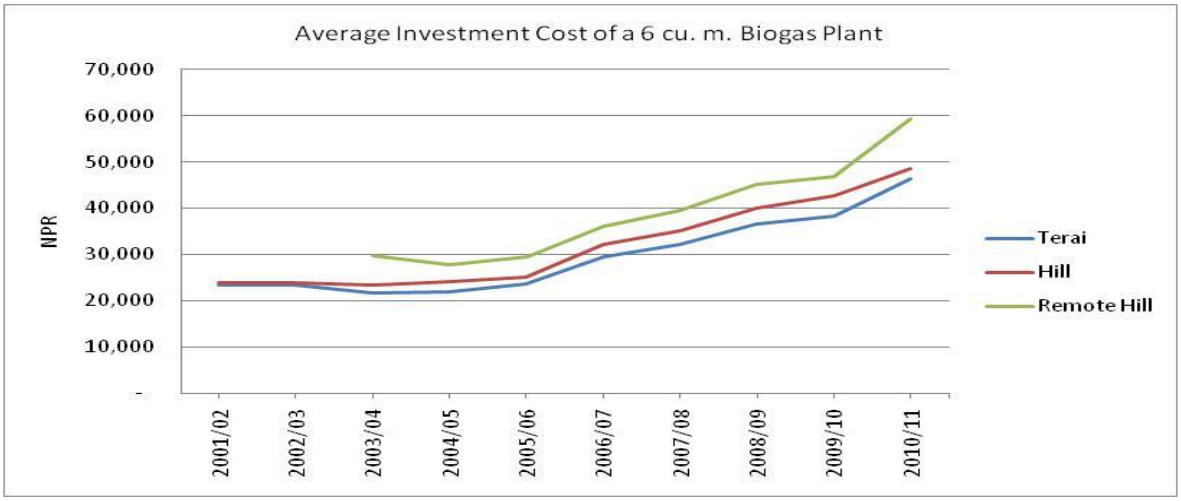
3. Solar Home Systems



Although still one of the most expensive renewable energy technologies when measured in terms of investment cost per unit of power, solar PV offers one of the most practical and least cost solution for providing basic electricity services for those living in remote areas, particularly where other resources are not available in the vicinity. Rapid technological advancement, innovative applications and increased competition have contributed to a steady decline in global prices. This trend is also evident in Nepal, as seen in the above cost curves (data source: Solar Electrical Manufacturers' Association of Nepal).

Taking the popular 20 Wp solar home system (SHS) as the basis, average unit prices in Fiscal Year ended 2011 ranged from NPR 16,050 (non-remote areas) to NPR 19,050 (very remote areas). As the bulk of the demand for SHS would be from the remote to very remote areas, and assuming a continued price decline (but at a slower pace), an average pre-subsidy market price of NPR 18,000 (USD 250) for a 20 Wp solar home system has been assumed in the SREP Investment Plan.

4. Biogas Plants



The cost of a typical 6 m^3 domestic biogas plant has increased steadily over the years. During Fiscal Year ended 2011 the average cost of such a plant ranged form NPR 46,484 in the *terai* region to NPR 59,395 in the remote hill region (data source: ESAP). However, the steep rise seen in recent years is expected to ease somewhat with capacity building, volume growth and competition. Accordingly, a figure of NPR 60,000 (USD 833) per plant has been assumed in the SREP Investment Plan.

Reliable average cost figures are not available for larger institutional plants. Likewise, plant capacities may vary considerably, depending on the end user. Considering the relatively small quantity of such plants being proposed, an average institutional plant capacity of 25 m^3 has been assumed with an estimated cost of NPR 225,000 (USD 3,125) in the SREP Investment Plan.

Annex 13

Investment Concept Brief

MINI AND MICRO HYDRO POWER

1. Problem Statement

Households that have no access to grid electricity rely on substitutes such as kerosene oil for their lighting needs. Kerosene lamps are not only a poor source of illumination, but are also polluting, unsafe and dependent on regular and reliable supply of fuel.

While mini and micro hydro power provide a viable alternative for energising such end users, who are typically remote, dispersed rural HH, these technologies too face barriers. They are site specific in that they require a stream or river in the vicinity with adequate flow and head for power generation. Further, the high initial cost and the absence of credit financing is a common problem faced by end users; while the remoteness and difficult terrain add to transaction costs of doing business with these communities.

2. Proposed Contribution to Initiating Transformation

Mini and micro hydropower mini grids support GoN's plans to scale up rural energy access, thus transforming these areas and communities, and positively impacting livelihoods. Productive use of electricity, particularly by day, will directly help in alleviating poverty in the community, while also stimulating the local economy through new opportunities for business. For instance mini grids attract the development of other related infrastructure that include clean water, better health care, education, employment creation, and information and communications technologies.

Access to electricity eliminates health risks arising from kerosene fumes, and fire hazards caused by toppled wick lamps; women and children in the HH are those who are most affected. Further, the elimination of kerosene lamps contributes to the mitigation of GHG emissions.

Experience shows that these community-based projects bring about improved social and gender inclusiveness and cohesion, as decisions are made in a consultative manner; many contribute 'sweat equity' during construction, and also later during operation and maintenance, thus establishing a stake in the venture; local youth get an opportunity to build technical competencies and leadership skills. In short, village reawakening through empowerment.

3. Implementation Readiness

GoN, through AEPC, has promoted the development of mini and micro hydropower for well over a decade. Over 900 such projects are already in operation. The basic institutional structures, private sector participants and business models are in place, but continue to evolve, duly supported by technical assistance and capacity building.

Renewable energy development is a priority agenda of GoN, and the annual budget has been progressively increased every year. AEPC, as the executing agency of the program, has developed in-house capabilities for program implementation, monitoring and evaluation.

At district and village levels, the DEEUs/DEESs that have been established provide support for planning and coordination. Survey, design, manufacturing and installation are done by pre-qualified companies and firms. Independent follow up visits are carried out at the time of power output testing and power output verification. Sustainability is enhanced through a mandatory one-year guarantee provided by the supplier/installer on the plant and equipment.

4. Rationale for SREP Financing

The country is presently experiencing a severe energy crisis, with regular load shedding by NEA. Grid penetration is low, with only 56% of HH having access to electricity. Fortunately, given the abundant availability of renewable energy resources in the country, for many remote rural communities RETs provide the least cost solution.

GoN has a plan to invest USD 1,076 million in renewable energy by 2020, which include mini, micro and pico hydro; solar home systems; and biogas plants. The Ministry of Energy is in the process of formulating a 20-year perspective plan for RETs.

Several donor-assisted mini and micro renewable energy programs have been implemented in the past, with many now in follow-on modes. The current annual budget for these programs is almost NPR 3 billion. However, most of these programs will be completed by 2012, and some even earlier. Hence, there is an urgent need for continued funding, and development partners are currently designing cooperation programs in consultation with GoN, with SREP financing adding value to the initiative by being a part of the larger scheme.

5. Results Indicators

Results	Indicators	Targets
1. Increase in the number of HH and enterprises supplied with electricity	No. of new HH connected to a mini grid	250,000
2. Productive end use of off-grid electricity	No. of new consumers using electricity for productive/income generating activities	TBD
3. Increase in renewable energy supply	Capacity addition through mini and micro hydro power	30 MW
4. Additional funding leveraged by SREP	Leverage factor, measured as SREP funding: all other sources	At least 1:4
5. Financing by banks for mini and micro hydro projects	Number of banks accredited as PFIs	TBD
	Number of loans disbursed	TBD
	Value of loans disbursed	TBD
6. GHG emission mitigated	Through mini and micro hydro power	69,000 tCO_2 p.a.

6. Financing Plan

The SREP-IP covers a five-year period. Being part of a greater national RET program (albeit still under development that will include RREP and other yet to be identified projects and partners), the SREP inputs will be viewed as a complementary component supporting national targets.

Financing for mini and micro hydro power projects is estimated as follows:

Financing Plan, USD '000

Investment	GoN	SREP Initial Allocation	RREP	Others (To be determined)	Private Sector Equity	Total	% of Total Program
Mini & micro hydro	20,000	5,579	56,944	24,144	26,667	133,333	25

Notes:

- From the SREP USD 40 million initial allocation, USD 20 million allocated for mini and micro energy initiatives, duly leveraged, will be disbursed through CREF. It will be utilised as a grant for subsidies and technical assistance; and as loans through a revolving fund.
- The SREP USD 20 million includes a sum of USD 3 million that will be allocated for technical assistance and capacity building for all the RET sectors. This amount is not reflected in the above table, as it belongs to a common pool, and the allocation will be determined later when details are worked out.
- 'Others' represents the funding gap. It will be bridged through funds from other donors, bank financing etc. However, it is expected to be at least partially addressed through an allocation from the USD 60 million SREP Reserve.

7. Project Preparation Timetable

Project preparation activities will cover the period July 2011 to September 2012.

8. Requests, if any, for Investment Preparation Funding

SREP financial assistance will be required to develop the detailed design for implementation.

Annex 14

Investment Concept Brief

SOLAR PV

1. Problem Statement

Households (HH) that have no access to grid electricity rely on substitutes such as kerosene oil for their lighting needs. Kerosene lamps are not only a poor source of illumination, but are also polluting, unsafe and dependent on regular and reliable supply of fuel.

While stand alone solar home systems (SHS) provide a viable alternative for energising such end users, who are typically remote, dispersed rural HH, renewable energy technologies too face barriers. The high initial cost and the absence of credit financing is a common problem faced by end users; while the remoteness and difficult terrain add to transaction costs of doing business with these communities. Nevertheless, solar PV technology is advancing rapidly, and prices are expected to decline in the years to come.

2. Proposed Contribution to Initiating Transformation

Solar PV supports GoN's plans to scale up rural energy access, thus transforming these areas and communities, and positively impacting livelihoods. Although low in energy output, solar PV does have applications for productive use of electricity, particularly in the areas of information technology and communications as well as benefits that can be derived from extended working hours after sunset.

Access to electricity eliminates health risks arising from kerosene fumes, and fire hazards caused by toppled wick lamps; women and children in the HH are those who are most affected. Further, the elimination of kerosene lamps contributes to the mitigation of GHG emissions.

Experience shows that the introduction of such technologies have spin off effects in rural communities. Local entrepreneurs set up or improve their businesses through value added services such as providing information and communication facilities, computer education and entertainment. Local youth get an opportunity to build technical competencies as service providers or users.

3. Implementation Readiness

GoN, through AEPC, has promoted the development of solar PV for well over a decade. More than 230,000 HH use SHS, while other applications are also taking off. The basic institutional structures including a solar PV testing facility at Khumaltar, Lalitpur; private sector participants; and business models are in place. But they continue to evolve, duly supported by technical assistance and capacity building.

Renewable energy development is a priority agenda of GoN, and the annual budget has been progressively increased every year. AEPC, as the executing agency of the program, has developed in-house capabilities for program implementation, monitoring and evaluation.

At district and village levels, the DEEUs/DEESs that have been established provide support for planning and coordination. Sustainability is enhanced through a mandatory one-year guarantee provided by the supplier/installer on the plant and equipment.

4. Rationale for SREP Financing

The country is presently experiencing a severe energy crisis, with regular load shedding by NEA. Grid penetration is low, with only 56% of HH having access to electricity. Fortunately, given the abundant availability of renewable energy resources in the country, for many remote rural communities RETs provide the least cost solution.

GoN has a plan to invest USD 1,076 million in renewable energy by 2020, which include mini, micro and pico hydro; solar home systems; and biogas plants. The Ministry of Energy is in the process of formulating a 20-year perspective plan for RETs.

Several donor-assisted mini and micro renewable energy programs have been implemented in the past, with many now in follow-on modes. The current annual budget for these programs is almost NPR 3 billion. However, most of these programs will be completed by 2012, and some even earlier. Hence, there is an urgent need for continued funding, and development partners are currently designing cooperation programs in consultation with GoN, with SREP financing adding value to the initiative by being a part of the larger scheme.

5. Results Indicators

Results	Indicators	Targets
1. Increase in the number of HH and enterprises supplied with electricity	No. of new HH using SHS	500,000
2. Productive end use of off-grid electricity	No. of new SHS consumers using electricity for productive/income generating activities	TBD
3. Increase in renewable energy supply	Capacity addition through SHS	10 MW
4. Additional funding leveraged by SREP	Leverage factor, measured as SREP funding: all other sources	At least 1:4
5. Financing by banks for solar PV	Total number of banks accredited as PFIs	TBD
	Total number of loans disbursed	TBD
	Total value of loans disbursed	TBD
6. GHG emission mitigated	Through solar PV	62,857 tCO_2 p.a.

6. Financing Plan

The SREP-IP covers a five-year period. Being part of a greater national RET program (albeit still under development that will include RREP and other yet to be identified projects and partners), the SREP inputs will be viewed as a complementary component supporting national targets.

Financing for SHS is estimated as follows:

Financing Plan, USD '000

Investment	GoN	SREP Initial Allocation	RREP	Others (To be determined)	Private Sector Equity	Total	% of Total Program
Solar home systems	18,750	5,231	53,385	22,635	25,000	125,000	24

Notes:

- From the SREP USD 40 million initial allocation, USD 20 million allocated for mini and micro energy initiatives, duly leveraged, will be disbursed through CREF. It will be utilised as a grant for subsidies and technical assistance; and as loans through a revolving fund.
- The SREP USD 20 million includes a sum of USD 3 million that will be allocated for technical assistance and capacity building for all the RET sectors. This amount is not reflected in the above table, as it belongs to a common pool and the allocation will be determined later when details are worked out.
- 'Others' represents the funding gap. It will be bridged through funds from other donors, bank financing etc. However, it is expected to be at least partially addressed through an allocation from the USD 60 million SREP Reserve.

7. Project Preparation Timetable

Project preparation activities will cover the period July 2011 to September 2012.

8. Requests, if any, for Investment Preparation Funding

SREP financial assistance will be required to develop the detailed design for implementation.

Annex 15

Investment Concept Brief

BIOGAS

1. Problem Statement

Biogas is primarily used as a fuel for cooking, as a substitute for traditional forms of energy such fire wood and cow dung. Although this technology is well developed in Nepal, there are barriers to overcome, more so in respect of designing larger applications such as institutional plants. The high initial cost and the absence of credit financing is a common problem faced by end users; while the remoteness and difficult terrain add to transaction costs of doing business with these communities.

2. Proposed Contribution to Initiating Transformation

Biogas plants, both domestic and institutional, support GoN's plans to scale up rural energy access, thus transforming these areas and communities and positively impacting livelihoods. Productive use of biogas, particularly in the case of institutional plants, will directly help in alleviating poverty in the community, while also stimulating the local economy through new opportunities for business. For instance applications beyond direct heat energy hold promise, such as the use of biogas for small scale power generation.

The clean blue flame produced by biogas eliminates health risks arising from fumes arising from the incomplete and inefficient combustion of firewood. Equally, if not more important, biogas for cooking relieves the burden of having to gather firewood, a chore traditionally assigned to women in the HH.

The environmental benefits are many. Biogas uses a readily available waste product as feedstock, and therefore does not depend on firewood that may be sourced indiscriminately which leads to deforestation and related environmental damage. The output slurry from a biogas plant is a valuable by-product that is used as organic fertilizer.

Biogas plants, particularly the larger institutional ones, also promote social and gender inclusiveness and cohesion, as construction often involves the local community. They provide opportunities for local youth to build technical competencies in construction, operation and maintenance, more so when additional applications such as power generation is included.

3. Implementation Readiness

GoN, through AEPC, has promoted the development of biogas for well over a decade. More than 240,000 such plants are already in operation. The basic institutional structures, private sector participants and business models are in place, but continue to evolve, duly supported by technical assistance and capacity building.

Renewable energy development is a priority agenda of GoN, and the annual budget has been progressively increased every year. AEPC, as the executing agency of the program, has developed in-house capabilities for program implementation, monitoring and evaluation.

The biogas program in Nepal is well established, commencing with the Biogas Support Program almost two decades ago. The sector is duly supported by a revolving fund for credit delivery, and the program is implemented by the Biogas Sector Partnership - Nepal.

At district and village levels, the DEEUs/DEESs that have been established provide support for planning and coordination. Design, manufacturing and installation are done by pre-qualified companies and firms. Independent follow up visits are carried out as required. Sustainability is enhanced through a mandatory one-year guarantee provided by the supplier/installer on the plant and equipment.

4. Rationale for SREP Financing

The country is presently experiencing a severe energy crisis, with regular load shedding by NEA. Grid penetration is low, with only 56% of HH having access to electricity. Fortunately, given the abundant availability of renewable energy resources in the country, for many remote rural communities RETs provide the least cost solution.

GoN has a plan to invest USD 1,076 million in renewable energy by 2020, which include mini, micro and pico hydro; solar home systems; and biogas plants. The Ministry of Energy is in the process of formulating a 20-year perspective plan for RETs.

Several donor-assisted mini and micro renewable energy programs have been implemented in the past, with many now in follow-on modes. The current annual budget for these programs is almost NPR 3 billion. However, most of these programs will be completed by 2012, and some even earlier. Hence, there is an urgent need for continued funding, and development partners are currently designing cooperation programs in consultation with GoN, with SREP financing adding value to the initiative by being a part of the larger scheme.

5. Results Indicators

Results	Indicators	Targets
1. Increase in renewable energy supply	Capacity addition through domestic and institutional biogas plants	150,000 plants
2. Additional funding leveraged by SREP	Leverage factor, measured as SREP funding: all other sources	At least 1:4
3. Financing by banks for biogas projects	Total number of banks accredited as PFIs	TBD
	Total number of loans disbursed	TBD
	Total value of loans disbursed	TBD
4. GHG emission mitigated	Through domestic and institutional plants	> 700,000 tCO_2 p.a.

6. Financing Plan

The SREP-IP covers a five-year period. Being part of a greater national RET program (albeit still under development that will include RREP and other yet to be identified projects and partners), the SREP inputs will be viewed as a complementary component supporting national targets.

Financing for biogas projects is estimated as follows:

Financing Plan, USD '000

Investment	GoN	SREP Initial Allocation	RREP	Others (To be determined)	Private Sector Equity	Total	% of Total Program
Biogas - domestic	17,500	4,882	49,826	21,126	23,333	116,667	22
Biogas - institutional	4,688	1,308	13,346	5,659	6,250	31,250	6
Total	22,188	6,190	63,172	26,785	29,583	147,917	28

Notes:

- From the SREP USD 40 million initial allocation, USD 20 million allocated for mini and micro energy initiatives, duly leveraged, will be disbursed through CREF. It will be utilised as a grant for subsidies and technical assistance; and as loans through a revolving fund.
- The SREP USD 20 million includes a sum of USD 3 million that will be allocated for technical assistance and capacity building for all the RET sectors. This amount is not reflected in the above table, as it belongs to a common pool and the allocation will be determined later when details are worked out.
- 'Others' represents the funding gap. It will be bridged through funds from other donors, bank financing etc. However, it is expected to be at least partially addressed through an allocation from the USD 60 million SREP Reserve.

7. Project Preparation Timetable

Project preparation activities will cover the period July 2011 to September 2012.

8. Requests, if any, for Investment Preparation Funding

SREP financial assistance will be required to develop the detailed design for implementation.