

**PROJECT INFORMATION DOCUMENT (PID)  
APPRAISAL STAGE**

Report No.: PIDA2809

<b>Project Name</b>	SREP-Supported Extended Biogas Project (P131592)
<b>Region</b>	SOUTH ASIA
<b>Country</b>	Nepal
<b>Sector(s)</b>	Other Renewable Energy (100%)
<b>Theme(s)</b>	Decentralization (30%), Rural services and infrastructure (70%)
<b>Lending Instrument</b>	Investment Project Financing
<b>Project ID</b>	P131592
<b>Borrower(s)</b>	Government of Nepal
<b>Implementing Agency</b>	Alternative Energy Promotion Center
<b>Environmental Category</b>	B-Partial Assessment
<b>Date PID Prepared/Updated</b>	17-Dec-2013
<b>Date PID Approved/Disclosed</b>	18-Dec-2013
<b>Estimated Date of Appraisal Completion</b>	20-Dec-2013
<b>Estimated Date of Board Approval</b>	18-Mar-2014
<b>Decision</b>	

## I. Project Context

### Country Context

1. The population of Nepal is estimated at about 26.5 million in the Census 2011 with a growth rate of 1.4% per annum. Nepal is predominantly a rural society with 83% of people living in rural areas. Nepal's economy experienced sustained GDP growth at a rate of 3.9% per annum on average over the past 10 years, above the rate of demographic growth of 1.4% per annum. The percentage of people living below the international line for extreme poverty has halved in only seven years, from 53.1% in 2004 to 24.8% in 2011.

2. Nepal is passing through a prolonged political transition following a 10-year violent conflict that ended in 2006. After almost a year of political turbulence, marked by policy inconsistency and delayed decision-making, the four largest political parties in March 2013 agreed on a technocratic interim administration which held elections on November 19, 2013 for a new Constitutional Assembly (CA). A new coalition government is expected to take up office in early 2014 and the CA will formulate a new constitution and then function as a parliament. The country's logistical limitations and inadequate infrastructure are the most important bottlenecks for growth. In the 2011/12 Global Competitiveness Report, Nepal was ranked 141st in overall quality of infrastructure. It is also among the poorest countries in the world and currently ranks 157th out of 187 countries on the Human Development Index. Poverty is more severe in rural areas (27%)

compared to urban areas (15%) and particularly severe in mountainous areas (42%) with ethnicity a dominant factor in these differences. Thus, despite improving standards of living, the country's level of human development remains among the lowest in the world.

### **Sectoral and institutional Context**

3. Nepal is currently facing an acute energy shortage, which is likely to be constraining GDP growth. Commercial and industrial entities in particular are dependent on very high cost sources of back-up energy, mostly diesel-generation of power, to meet their own requirements to remain operational. Certain commercial agricultural and agro-processing businesses, as well as large institutions and certain municipalities, may be neglecting a potential alternative, cheaper source of backup energy to offset a part of their currently prohibitive "coping costs". If this alternative approach is successful, it would reduce their exclusive reliance on expensive back-up fuels such as diesel, LPG, firewood and coal. The proposed alternative is biogas, which has remained previously unexplored at a larger, commercial scale in Nepal, although Nepal is well-known for the promotion of individual, household size digesters of a very small size.

4. Biogas, or deliberate capture of methane from rotting organic waste, is a widely available renewable energy source, like solar and wind energy, and can be recovered using relatively simple technology. Nepal currently has an active and successful on-going government program to support the dissemination of household sized biogas plants (of two, four and six cubic meters) in rural areas, which has been in place for two decades. The program has relied on a single approved design for the biogas plant (digester), and has been heavily subsidy driven, with successful adoption by around 262,000 households.

5. Renewable energy technologies are promoted through Government financial support by the Alternative Energy Promotion Center (AEPCC), which is the implementing arm of the Ministry of Science, Technology and Environment. AEPCC's new flagship program document of July 2012 for the five-year National Rural and Renewable Energy Program (NRREP), also recognizes the importance of introducing and capturing the energy benefits of large biogas plants, (defined as twelve cubic meters and above), as the country struggles with widespread energy shortages. Large biogas plants and associated mature technological upgrades in recovery and storage of biogas are common in Nepal's neighboring countries (India, Bangladesh), but these new technologies and plant sizes have not yet been introduced to Nepal, where the market looks very promising for this kind of renewable energy solution.

6. Private enterprises in Nepal (both large scale formal sector firms and MSMEs), as well as municipalities and residential institutions are all battling the high costs of imported fossil fuels for thermal process heating, water heating and diesel-fired captive electricity generation, while simultaneously coping with the need for expensive LPG cooking gas cylinders and rising costs of commercially purchased coal and firewood. Coal and firewood are frequently used for continuous cooking in residential institutions such as boarding schools, army barracks, police stations, prisons, university campuses, temple complexes. Municipalities struggle to afford the fuel and transportation cost of delivering municipal waste to transfer stations or to the landfill.

7. Experience from the region indicates that successful use of medium to large biogas plants for captive use of energy can generate important savings in avoided purchases of commercial fuels, or in the case of captive electricity generation, can save on diesel usage for backup generation.

Prospects of benefitting from large biogas plants are particularly promising for commercial enterprises and institutions that generate large and regular volumes of waste as part of their ongoing business processes and must in fact pay to dispose of them.

8. Primary sources of biogas feedstock for large scale projects in Nepal would include dairy and piggery-farm manure, poultry litter, sewage, organic portions of municipal waste, green waste, hotel and restaurant kitchen waste, slaughterhouse waste, plant residue material, distillery waste, bagasse, fruit juice processing pulp waste, and other animal and crop residues. Commercially valuable biogas can be recovered with the application of relatively simple and modern designs of large digester technology to the feedstock—these technologies need to be introduced to Nepal, preferably through commercial partnerships with Nepali private entrepreneurs to ensure sustainability of the project once the initial public-sector funding support is over. Previous heavily subsidized attempts in Nepal have not been successful or sustainable due to unclear assignment of responsibilities and ownership, or possibly due to incorrect usage and lack of maintenance. This need not be the case, if incentives are properly aligned; all of these biogas recovery and upgrading processes, including on-site electricity generation from enriched biogas, are widely used on a commercial scale internationally, and also in Nepal’s neighboring countries, and are “low-tech”, locally managed and relatively inexpensive. Depending on the cost of fuel that is being displaced, and the monthly cash expenditures on that fuel, payback periods for investment in large-scale biogas technologies can range between one to four years.

9. Recovery of Biogas for Productive Uses also contributes to Climate Change Mitigation. Atmospheric emissions of biogas from natural and man-made sources contribute to climate change due to methane’s potent greenhouse gas properties, which are 21 times as potent as carbon dioxide. Normally, manure that is left to decompose in the open air releases two main gases that cause global climate change: nitrous oxide and methane. Nitrous oxide (N<sub>2</sub>O) warms the atmosphere 310 times more than carbon dioxide, and methane warms the atmosphere 21 times more than carbon dioxide. Capturing biogas for productive use rather than allowing it to degrade further and release harmful greenhouse gases is thus an environmental win-win proposition.

10. The next stage of development for the Government’s biogas program, implemented by AEPC, is to prepare support mechanisms for the introduction of large scale biogas plants, using organic wastes generated from commercial, institutional and municipal sources. The World Bank proposes, through the \$8m catalytic SREP grant and an innovative, private sector oriented project design, to support AEPC and the local biogas consultancy and construction community in its efforts to introduce large scale private sector-led biogas plants to Nepal; to build capacity in the local financial sector to understand and assess the technology and credit risks, and to gain local experience with extending commercial financing to some of the best-prepared projects; and to build adequate Monitoring and Evaluation capacity to track biogas production from large plants, and assess the impact of the introduction of successful large scale biogas on the growth of commercial and institutional entities.

11. The SREP project is designed to add value over and above the existing plans under NRREP for the introduction of single-design large biogas plants, through its emphasis on (i) modern diverse technology acquisition and a competitive application process by interested project developers and owners, with independent review mechanisms; (ii) private sector focus and establishment of large biogas plants owned and operated by Nepali entrepreneurs; (iii) introduction of commercial financing; (iv) detailed technical and commercial inputs at the business plan stage; and (v) the

“SREP way” of crowding in other funds on a 4:1 ratio. It is expected that the successes of SREP Biogas will be mainstreamed into the next phase of the NRREP large biogas digester program, based on local biogas experts’ familiarization during the SREP implementation period with new imported technologies and their performance in Nepal.

## II. Proposed Development Objectives

The project development objective is to promote medium and large scale biogas energy generation with private sector partnership.

## III. Project Description

### Component Name

Technical Assistance (\$1.0 million)

### Comments (optional)

- (a) Identification of Investors and Review of Technical and Commercial feasibility studies
- (b) Capacity building of local stakeholders regarding familiarization with large scale biogas technologies

### Component Name

Financing of Investments (\$7.0 million)

### Comments (optional)

This will involve a limited financial grant contribution by AEPC using SREP funds for "viability gap financing" or "capital cost buy-down" up to 20% [up to a max. threshold of US\$0.5m per project]

## IV. Financing (in USD Million)

Total Project Cost:	32.00	Total Bank Financing:	0.00
Financing Gap:	0.00		
<b>For Loans/Credits/Others</b>			<b>Amount</b>
Borrower			8.00
Strategic Climate Fund Grant			8.00
Local Sources of Borrowing Country			16.00
Total			32.00

## V. Implementation

12. AEPC will be the executing agency for the project. AEPC has developed an innovative on-line application form in Nepali and English, which may be used by eligible private entrepreneurs and institutions seeking to invest in large biogas plants (over 35 m<sup>3</sup>) with AEPC support. Incoming applications will first pass through a fact-checking screening and pre-feasibility assessment. The technical and commercial studies will then be reviewed by an Independent Technical Expert and an Independent Commercial Expert convened by AEPC, who will make recommendations to a committee during a monthly meeting consisting of membership from MoSTE, AEPC and an Outside Observer. Minutes of these meetings will be confirmed by the Independent Observer and will be posted on AEPC’s website.

13. Independent experts (Technical and Commercial) will provide guidance and assistance for

the review process of applications received, in terms of (i) acquisition of the technology from abroad; (ii) choice of appropriate technology(ies) suitable for a specific substrate/feedstock; (iii) capacity / sizing of the plant based on availability of wastes; (iv) development of norms for evaluation of Plant Performance Guarantee (PPG) committed by the technology suppliers; (v) standardization of the technology packages for replications; (vi) development of Model MoUs/Agreements/Contracts; (vii) commercial viability of the project and appropriate structure of commercial financing; and (viii) any other guidance required.

14. If the project application passes the above technical and commercial viability checks, and is in conformity with the ESMF, then the experts will recommend the project as a candidate for support under SREP and issue a commitment letter in keeping with GoN subsidy policy. The applicant for a commercial or municipal waste to biogas project then takes the detailed technical studies, the business plan and the commitment letter to potential funders (debt and equity) in order to reach financial closure. Institutional or Community applicants may not be able to attract commercial funding, but will also seek to complement their SREP allocation with other co-financing e.g. from NRREP.

15. AEPC will disburse the subsidy as per its subsidy delivery mechanism following financial closure, and confirmation of other sources of financing. Plant construction begins. Following commissioning and testing of the plant, the project developer provides information to AEPC annually on biogas production and plant operation. This is reviewed periodically by AEPC through random verification checks as part of its monitoring and evaluation activities.

## VI. Safeguard Policies (including public consultation)

<b>Safeguard Policies Triggered by the Project</b>	<b>Yes</b>	<b>No</b>
Environmental Assessment OP/BP 4.01	<b>x</b>	
Natural Habitats OP/BP 4.04	<b>x</b>	
Forests OP/BP 4.36	<b>x</b>	
Pest Management OP 4.09		<b>x</b>
Physical Cultural Resources OP/BP 4.11	<b>x</b>	
Indigenous Peoples OP/BP 4.10	<b>x</b>	
Involuntary Resettlement OP/BP 4.12	<b>x</b>	
Safety of Dams OP/BP 4.37		<b>x</b>
Projects on International Waterways OP/BP 7.50		<b>x</b>
Projects in Disputed Areas OP/BP 7.60		<b>x</b>

### **Comments (optional)**

An Environmental and Social Management Framework (ESMF) has been prepared by AEPC and has undergone two public consultations. It is posted on AEPC's website. An ESMF officer has been appointed by AEPC to work exclusively on this project, and will be responsible for ensuring that SREP-supported projects are consistent with the ESMF during preparation and also during implementation.

## VII. Contact point

### **World Bank**

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