

Bhutan micro hydro
Blue file

United Nations Development Programme
Global Environmental Facility
PROJECT DOCUMENT for PDF Funding (Block A)
Project of the Royal Government Bhutan

TITLE AND NUMBER: BHU/97/G41/A/1G/31: Micro Hydro Development
Project

COUNTRY: Bhutan

CONVENTION RATIFICATION: 25 August 1995

DURATION: 2 months (including in-country mission to undertake GEF consultations and brief finalisation in Dec. 1997)

ACC/UNDP SECTOR AND SUBSECTOR 2000 Environment, Climate Change

GEF FOCAL AREA: Climate Change

EXECUTING AGENCY: UNOPS

ESTIMATED START DATE: Early December 1997

GOVERNMENT ENDORSEMENT : National Budget and Aid Co-ordination Division (NBACD), Ministry of Finance, Royal Government of Bhutan, dated 22 March 1997

UNDP/GEF INPUT PDF FUNDS: US \$ 25,000 for PDF Block A funds

Brief Description: The overall objective of the proposed PDF A will be to prepare and finalize a GEF project brief for submission and review at GEF Bilateral Consultation to develop a full scale project for removing barriers for developing micro/mini hydropower in Bhutan, obviating the need for expansion of conventional sources of energy which could result in severe deterioration of the environment and add to the increase in greenhouse gas emissions and global warming. As a party to the UNFCCC, Bhutan has identified this intervention as a priority activity.

APPROVED:
On behalf of:

UNDP: [Signature] 24/12/97
Signature Date Name/Title

UNOPS: [Signature] 22/12/97 INGOLF SCHUEZ-HUELLER, Chief ENUS
Signature Date Name/Title

Proposal for PDF Block A Grant

I. Eligibility

1. LOG DATA

(a) Project Title:	Removing barriers to small hydropower development in Bhutan
(b) Identification No.	BHU/97/G41/A/1G/31
(c) Implementing Agency :	<u>UNDP</u>
(d) IA Focal Point :	<u>Nandita Mongia, Regional GEF Co-ordinator for Climate Change, RBAP</u>
(e) Principal Focal Area:	<u>Climate Change</u>
(f) Cross-cutting Area:	
(g) Scope:	<u>National</u>
(h) Country:	<u>BHUTAN</u>
(i) Country Endorsement:	<u>22 March 1997</u>
(j) National Focal Point:	<u>Division of Power, Ministry of Trade & Industry</u>

2. Country Eligibility:

(a) Convention: Climate Change

Date of Ratification: 25 August 1995

(b) GEF: Art 9 (a) X Art. 9(b) X

3. Program Eligibility:

(a) **COP Guidance:** The proposed project will address development of renewable energy resources which is an important initiative for reducing emissions, as per COP2 guidance.

(b) **GEF: Operational Strategy -** The proposed project falls under operational programme #6 of the Operational Strategy as it promotes the adoption of renewable energy by removing barriers and reducing implementation cost.

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4. Policy Framework:

(a) Country Priority:

- (i) National strategy/action plan: The Royal Government of Bhutan (RGOB) places very high priority in developing its rich hydropower resources and it is within the National Energy Strategy Policy and Eighth Five Year Development Plan (1997-2002). The potential for power generation from the major river systems in Bhutan is about 30,000 MW. Presently, 345 MW power is being generated out of which 80% is exported. Hydropower is not only an important source of revenue for the government through its export but is also vital for the local industrial development and for improving the livelihoods of the people especially in the rural areas. Today, most of the major towns are electrified while rural areas are hardly connected, except a few villages close to the main grids. The Royal Government's policy, however, is to eventually electrify all parts of Bhutan to maintain balanced development and to reduce the use of fuelwood, kerosene and diesel for environmental reasons. As most of the rural communities, comprising of over 85% of the population, are isolated from the main power grids, development of stand-alone micro/mini hydels will be vital in fulfilling the Royal Government's objective of supplying electricity to all parts of the country in near future.
 - (ii) Link to sustainable development planning: the proposed project will stimulate the wide use of sustainable long term alternative energy sources, involving private sector partnership and community participation.
- (b) Other Links: Other global agreements/conventions UNFCCC

5. Nature and Scope of expected project:

- (a) Investment
- (b) Technical Assistance X
- (c) Convention-specific enabling activities
- (d) Capacity building X
- (e) Targeted research

6. Linkage of Expected Project to IA Program

This project will be taken up as a part of UNDP's up coming Country Cooperation Framework (CCF) programme as one of the main Green House Gas (GHG) mitigation programmes under the current Bhutan GHG project. This project is expected to have direct linkage with the horticulture and CSMI projects under the Sustainable Livelihoods area of concentration and with the Jigme Dorji National Park project under the Environment and Renewable Natural Resources area of concentration being taken up during the current UNDP CCF programme in Bhutan.

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7. Activities

a. PDF-funded

The main objective of this project is to assist the Royal Government in formulating and finalizing a GEF brief to submit for possible GEF financing in developing its micro/mini hydro resources. This PDF A will thus cover the costs for a) an international specialist to undertake a mission to Bhutan where, in consultation with the country office and Royal Government, the International Consultant will finalize a GEF project brief to be submitted to the GEF for possible financing; and for incorporating the comments of the technical reviewers, where appropriate, into the final brief; b) an International Specialist to work with the International Consultant 3 days in Bhutan to assist in fleshing out implementation arrangements; c) one national consultant to assist the international consultant in the project brief development activities, including the organization of the project formulation workshop.

- b. Non-PDF funded: The full project is expected to draw funding from GEF fund with possible co-funding from UNDP, ADB, and bilateral donors such as Netherlands, Denmark, Japan Trust Funds, etc.

8. PDF Justification

The main objective of this project is to assist the Royal Government of Bhutan in developing its micro/hydropower resources to supply electricity cost effectively to rural villages which are isolated from the main power grids through capacity building in micro hydro resource assessment, demonstration testing of small hydropower technologies linking with income generating rural activities appropriate to different locations, training of manpower resource in small hydropower production and management, promotion of private sector involvement in small hydropower production and management, and improving linkage and coordination of the institutes involved in the energy sector.

By identifying and estimating the potential for utilizing micro/mini hydropower (MHP), the proposed project would reduce information barriers and reduce risks associated with MHP project. The project is expected to achieve its goal through listing, analyzing and prioritizing barriers to promotion of small hydropower in Bhutan and by identifying and implementing measures for overcoming the barriers. It is expected that the full scale project will result in the installation of micro/mini hydropower in Bhutan through project identification with GEF financing of the non-incremental cost of small hydropower capacity development.

9. Relationship to Expected Project and Global Benefit(s):

The GEF Operational Programme for Promoting the adoption of renewable energy by removing barriers and reducing implementation costs targets commercial or near-commercial renewable energy technologies to reduce high implementation costs of renewable energy technologies due to low volume or dispersed application. The expected full project will contribute at the global level in reducing the green house gas emissions through fuelwood substitution and enhancement of CO2 sinks.

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The PDF Block A funds requested would develop a GEF project brief for a full scale GEF project which will include listing, analyzing and prioritizing barriers to promotion of small hydropower in Bhutan. The PDF activities will develop activities to complete at least the following:

- Review of micro/mini hydropower resource assessment and identifying and preparation of a strategic masterplan/action plan of such hydro projects for rural areas in Bhutan;
- Identification of suitable micro/mini hydropower technology package for demonstration and commercial application, and possible manufacture in Bhutan;
- Estimation of the total financial investment requirement of micro/mini hydropower development package and the time horizon of such an investment;
- Identification of co-financial investment requirement of small hydropower development and the time horizon of such an investment;
- Suggest innovative financing mechanism for small hydropower projects using Government, GEF and other co-financing commitments;
- Institutional strengthening and capacity enhancement for instituting supportive legal, regulatory and policy changes. In order to achieve this it would be critical to design measure to develop capabilities for formulating and analyzing national, regional and local energy strategies, in general, and rational electric power utility regulation. For small hydropower development in particular, activities to enhance skills in analyzing small, non-traditional projects will be designed.
- Develop workshop facility to provide supporting services to the micro hydels and also to serve as control and certification center for micro hydro production technologies.
- Propose mechanism for setting up of Information Center and service for disseminating information and for reducing the perceived risk associated with new technologies.

In addition to the above, project activities will be designed to:

- develop a monitoring and evaluation framework to monitor the specific and programmatic benefit of the project; and
- estimate the potential global benefits (both, short-term and long-term) of the project.

10. Activities to be financed by the PDF Block A grant:

Item	Person months	Amount (in US \$)	1997
10.00 Project Personnel	.85	16,800	16,800
11.01 International Consultant including travel costs, DSA etc.			
11.1 International Consultant (3 days), including travel costs from Delhi, DSA, etc.		3,100	3,100
17.01 National consultant	1	1,200	1,200
19.99 Component total		21,100	21,100
32.01 Workshop 1 day		650	650
50.00 Miscellaneous			
52.01 Reporting costs		200	200
53.01 Sundry		1000	1000
93.00 Agency Support Costs			
93.01 UNOPS		1850	1850
999.00 Total		25,000	25,000

11. Expected Output(s) Date(s):

- a. The outputs of the proposed set of activities financed by GEF's PDF Block A Funds will include:
 - UNDP/GEF Project Brief consistent with the GEF Operational Strategy under Operational Programme # 6: Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs, to be submitted to Country Office and RBAP/GEF New York on last day of project mission
 - A mission report providing an assessment/review of key issues and all contacts upon completion of mission
- b. Completion date: end January 1998

**TERMS OF REFERENCE - International Consultant (1) Mr. Hugues LE BARS
UNDP/GEF MISSION TO BHUTAN TO DEVELOP
MICRO/MINI HYDROPOWER PROPOSAL**

BACKGROUND:

1. The GEF has been designated as the interim funding mechanism for both the Climate Change and the Biodiversity Conventions. It will also continue to assist developing countries in three additional areas: (a) prevention of pollution of international waters; (b) prevention of the destruction of the stratospheric ozone layer; and (c) prevention of land degradation, primarily desertification and deforestation as they relate to the existing GEF objectives. The responsibility of the GEF is shared between three multi-lateral agencies: the United Nations Development Programme (UNDP); the United Nations Environment Programme (UNEP); and the World Bank (WB).
2. The UNDP is responsible for technical assistance, training, capacity building and other pre-investment activities related to the GEF. In this regard, UNDP works in close coordination with its member countries and with the support of its resident missions to identify, define and implement all aspects of technical assistance, training, capacity building and pre-investment activities that are necessary to achieve the objectives of the Environmental Conventions. This includes the United Nations Framework Convention on Climate Change (UNFCCC) which Bhutan ratified on 25/8/95.
3. The overall objective of the mission will be to prepare and finalize a GEF project brief (and annexes) and draft project document for submission and review at GEF Bilateral Consultation. The objective of the proposed brief/project document will stimulate the wide use of sustainable long term alternative renewable energy resources through developing a full scale project for removing barriers to small scale (including mini/ micro) hydropower development in Bhutan, obviating the need for expansion of conventional sources of energy which could potentially result in severe deterioration of the environment and add to the increase in greenhouse gas emissions and global warming.

SCOPE OF WORK

4. The UNDP international consultant's assignment will include a 14 working day mission to Bhutan to prepare a finalized GEF project brief (and annexes) and draft UNDP project document in standard UNDP format within the guidance of the GEF Operational Strategy under Operational Programme # 6 related to "barrier reduction". The international consultant will be responsible to the UNDP Resident Representative and the RBAP/GEF Regional Coordinator for Climate Change and upon the start of mission, will meet with the UNDP Resident Representative. The UNDP Country office will determine and arrange for meetings with the relevant Ministries and local counterpart agencies.
5. The role of the GEF International consultant will include :
 - (i) listing, analyzing, prioritizing, and explaining in detail all of the significant barriers to the promotion of small hydropower in Bhutan. The PDF exercise will examine activities to complete at least the following:
 - mini/micro hydropower technology packages are not currently commercially produced on

significant scale in Bhutan;

- **limited manufacturing base for mini/micro hydropower systems given limited effective demand and limited ability to pay;**
- **lack of significant field demonstration of mini/micro-hydropower systems;**
- **limited ability of the village community to manage and maintain the mini/micro-hydro power systems;**
- **limited ability to pay for the energy services for commercial viability;**
- **limited involvement of entrepreneurs in producing mini/micro-hydropower systems for rural applications;**
- **financial viability not yet established on a significant scale;**
- **trained manpower to plan, implement and monitor mini/micro-hydropower system do not exist on a significant scale**
- **estimate the scope for micro/mini hydropower schemes that are not being implemented in Bhutan due to the existence of barriers, and expected contribution of these projects to the mitigation of greenhouse gases;**
- **The International Consultant should determine possible benefits from linkages with the regional expertise developed at the Regional Center for Mini and Micro Hydro (INSHP) in Hang Zhou, China, an internationally recognized institution of excellence in small hydro development.**
- **During stop-over(s) in New Delhi (max. 2 days DSA), the consultant will meet with representatives from UNDP New Delhi and/or project team members of the UNDP/GEF project IND/92/G31: Optimizing Development of Small Hydel Resources in Hilly Regions to discuss lessons learnt and application of best practices**
- **Analysis of detailed maps and site inventories in order to undertake a site assessments**

(ii) identifying ways of overcoming these barriers detailed in (i) above, including full assessment of the risks involved and likelihood of success. Given the likely existence of a large number of barriers, it is unlikely that any single project will lead to the removal of all of them. Therefore, it is likely that a programme / project which leads systematically through the gradual elimination of the barriers finally identified will be developed from the GEF mission. The assessment of how best to overcome these barriers will be developed into a strategy to ensure financial sustainability of the project beyond its lifetime. In a sequential manner, therefore, it is estimated that the proposed project would:

- **propose specific measures to reduce these barriers;**
- **demonstrate the sustainability of micro/mini hydropower projects after GEF support has ended (following both barrier and removal), including demonstrations of cost recovery;**

- estimate the overall financial requirements and time horizon;
- analyze and highlight the potential impact of the project in dealing with the issue of market penetration.
- show how the programmatic benefits will be monitored and the subprogram evaluated; and
- estimate the potential global benefits (both short-term and long-term) of this approach.

(iii) The international consultant will assist the Country Office to identify potential sources of project cofinancing.

- Under the guidance of the Resident Representative, the international consultant will determine the scope of the present activity in relation to any previous or on-going national initiatives in micro hydro development

6. In elaborating the project brief (and annexes), the international consultant will :

a) Finalize the technical assistance required for all project components; indicate measurable performance indicators for each TA component.

b) It is anticipated that GEF incremental funds would be linked to baseline funding for the total cost of the project and that the GEF project would only be developed for submission for clearance in the event that significant co-financing becomes available. The international consultant will identify specific activities to be funded by GEF, UNDP (IPF), and potential sources of co-funding.

c) Incremental GEF funding will be estimated during the mission for the full project, to fund activities not reasonably expected to take place without UNDP-GEF support and could not reasonably be expected to be undertaken as part of Bhutan's baseline activities in the energy sector, (and are not covered by other initiatives).

The International Consultant will, based on the GEF incremental cost calculation procedures, calculate the final incremental costs. Specific activities funded by GEF could include all components of the project related to building endogenous capacity, improving public awareness and demonstrating and disseminating the technologies through rural Bhutan.

d) Baseline funding will be determined on the basis of providing costing for activities in this proposal that the Royal Government of Bhutan could reasonably be expected to undertake in support of its objectives in the energy sector and which, in the absence of GEF support, could reasonably be expected to be funded by the Government. The International Consultant should assist to identify additional baseline co-financing from UNDP (IPF), other sources. The International Consultant will calculate and flesh out in detail these activities in elaboration of the project document.

e) The project document should explicitly reflect the process to be followed during the project execution. The interministerial complementarity and line of reporting should be spelled out explicitly in the document, and preferably reflected in an organogram.

f) Prior to departure from Bhutan, a local Project Appraisal Committee (PAC) meeting, to review and appraise the draft project document will be held with the relevant staff of the UNDP Bhutan office. The International consultant will be responsible for incorporating the minutes of the PAC into the document prior to forwarding the document to UNDP Headquarters. The International consultant will be responsible for revising the project brief/annexes/document to reflect all comments provided by GEF Bilateral, GEF Council, technical Reviewers etc.

OUTPUTS:

7. The outputs of the GEF mission would include:

- a draft GEF project brief (and annexes) under operational programme #6 of the GEF climate change operational strategy in standard GEF project brief format (including full incremental cost annex) to be presented at local PAC (LPAC) prior to end of mission; a revised draft GEF project brief incorporating the comments of the LPAC to be delivered to UNDP Bhutan and RBAP/GEF within 10 days of completion of mission)by end Dec. 1997)
- revised project brief/annexes incorporating relevant concerns raised by technical reviewers within one week of receipt of all technical comments.
- a draft UNDP project document incorporating the comments of the local PAC and technical reviewers by end Dec. 1997
- A one page summary description attached to the draft project brief/document as an annex which responds to the concerns of the GEF Bilateral, GEF Council and technical reviewers and explains how and where in the project document they have been taken into account.
- A brief mission report including names and titles of all persons contacted/meetings with relation to the mission, processes and discussion.

8. All documents, i.e. (i) project document and (ii) mission report etc. , need to be submitted as follows:

- One master copy of each document in non-stapled form;
- electronic version on 3.5" diskette using Microsoft Word or Wordperfect Software for each project brief/project document.

COSTS: To be negotiated by UNOPS to cover costs as follows:

Honorarium (anticipated at approx. \$550/day) 19 days calculated as follows:

2 preparation days, 14 working days in Bhutan, 3 days at desk to incorporate all comments into finalised project brief/annexes and draft project document

Travel - Paris/New Delhi/Kathmandu/Thimphu/Kathmandu/New Delhi/Paris for a 14 working day mission in Bhutan, plus terminal allowances, plus DSA. UNDP Bhutan will request BL53 funding to cover costs for in-country travel to prospective sites

DURATION: mid December - End of Jan. 1998.

**TERMS OF REFERENCE - International Consultant (2) Ms. Anjali Shanker
UNDP/GEF MISSION TO BHUTAN TO DEVELOP
MICRO/MINI HYDROPOWER PROPOSAL**

BACKGROUND:

1. The GEF has been designated as the interim funding mechanism for both the Climate Change and the Biodiversity Conventions. It will also continue to assist developing countries in three additional areas: (a) prevention of pollution of international waters; (b) prevention of the destruction of the stratospheric ozone layer; and (c) prevention of land degradation, primarily desertification and deforestation as they relate to the existing GEF objectives. The responsibility of the GEF is shared between three multi-lateral agencies: the United Nations Development Programme (UNDP); the United Nations Environment Programme (UNEP); and the World Bank (WB).
2. The UNDP is responsible for technical assistance, training, capacity building and other pre-investment activities related to the GEF. In this regard, UNDP works in close coordination with its member countries and with the support of its resident missions to identify, define and implement all aspects of technical assistance, training, capacity building and pre-investment activities that are necessary to achieve the objectives of the Environmental Conventions. This includes the United Nations Framework Convention on Climate Change (UNFCCC) which Bhutan ratified on 25/8/95.
3. The overall objective of the mission will be to prepare and finalize a GEF project brief/annexes and draft project document for submission and review at GEF Bilateral Consultation (formerly GEFOP). The objective of the proposed brief/project document will stimulate the wide use of sustainable long term alternative renewable energy resources through developing a full scale project for removing barriers to small scale (including mini/ micro) hydropower development in Bhutan, obviating the need for expansion of conventional sources of energy which could potentially result in severe deterioration of the environment and add to the increase in greenhouse gas emissions and global warming.

SCOPE OF WORK

The UNDP international consultant's assignment will include 3 working days in Bhutan to assist in the determination of financing and implementation arrangements, to participate in the LPAC/project launch workshop, and to collaborate with International Consultant #1 in the finalisation of the Project Brief and its annexes, as well as the draft project document. The consultant will meet with representatives from UNDP New Delhi and/or project team members of the UNDP/GEF project IND/92/G31: Optimizing Development of Small Hydel Resources in Hilly Regions to discuss lessons learnt and application of best practices

COSTS: To be negotiated by UNOPS to as follows:

Honorarium: \$550/day (prevailing UNOPS rate)

3 days honorarium for work in Bhutan, 5 days DSA for Bhutan, travel New Delhi/Thimphu/New Delhi, terminal allowance

DURATION: 3 days mid December 1997

**DRAFT TERMS OF REFERENCE - National Consultant
UNDP/GEF MISSION TO BHUTAN TO DEVELOP
MICRO/MINI HYDROPOWER PROPOSAL**

A. BACKGROUND:

1. The GEF has been designated as the interim funding mechanism for both the Climate Change and the Biodiversity Conventions. It will also continue to assist developing countries in three additional areas: (a) prevention of pollution of international waters; (b) prevention of the destruction of the stratospheric ozone layer; and (c) prevention of land degradation, primarily desertification and deforestation as they relate to the existing GEF objectives. The responsibility of the GEF is shared between three multi-lateral agencies: the United Nations Development Programme (UNDP); the United Nations Environment Programme (UNEP); and the World Bank (WB).
2. The UNDP has the prime responsibility for technical assistance, training, capacity building and other pre-investment activities related to the GEF. In this regard, UNDP works in close coordination with its member countries and with the support of its resident missions to identify, define and implement all aspects of technical assistance, training, capacity building and pre-investment activities that are necessary to achieve the objectives of the environmental conventions.
3. The overall objective of the mission will be to prepare and finalize a GEF project brief and draft project document for submission and review at GEF Bilateral Consultation (formerly GEFOP). The objective of the proposed brief/project document will stimulate the wide use of sustainable long term alternative renewable energy resources through developing a full scale project for removing barriers to small scale (including mini/ micro) hydropower development in Bhutan, obviating the need for expansion of conventional sources of energy which could potentially result in severe deterioration of the environment and add to the increase in greenhouse gas emissions and global warming.

C. SCOPE OF WORK:

3. The mission will be undertaken jointly by an International Consultant, who will serve as team leader, and a national consultant. (A second international consultant may work with the team for 3 days at the end of the mission). The team will be responsible to the UNDP Resident Representative and the RBAP/GEF Regional Coordinator for Climate Change. The team leader and the consultants, upon the start of mission, will meet with the UNDP Resident Representative. The main tasks for the national consultant will be to assist the UNDP Country Office in determining and arranging for meetings with the relevant Ministries and local counterpart agencies, facilitating a consultative workshop, and to backstop the two other team members on technical questions pertaining to the special circumstances in Bhutan.
- f. The national consultant will commence work five days prior to the arrival of the team leader to assist putting in place the groundwork for the elaboration of the project brief. Working in close consultation with the UNDP Country Office and the relevant Bhutan Government Departments, the national consultant will organize and facilitate a one day consultative workshop with the main stakeholders. This task includes preparing the list of stakeholders, intimating to the stakeholders that a workshop is to be held, follow up with the stakeholders, facilitating the consultative workshop and assist in incorporating the comments from the workshop in the project brief. The national consultant will also backstop the mission on technical matters.

g. The National Consultant will assess the possible impact of the project on alleviating poverty in rural areas and recommend project outputs and activities that will help maximize such impact.

A. THE PROJECT :

The draft project document should explicitly reflect the process to be followed during the project execution. The interministerial complementarity and line of reporting should be spelled out explicitly in the document, and preferably reflected in an organogram.

The GEF project brief and the draft project document should reflect the barriers to renewable energy adoption in Bhutan and the project's capacity to address them on a sustainable basis. The impact of the project in dealing with the issue of market penetration needs to be highlighted in the project document.

The team leader and consultants will take part in a participatory project formulation workshop scheduled for the first week of the mission. Potential partners will be invited to contribute to the development of the proposal.

B. Baseline funding. The team leader will be assisted by the international consultant and national consultant in determining baseline funding on the basis of providing costings for activities in this proposal (anticipated approx. \$5m-\$6m). UNDP (TRAC) will supplement multilateral donor funds. The International Consultant (B) and National Consultant will assist the Team Leader in calculating and fleshing out in detail these activities in elaboration of the project document.

5. The role of the GEF national consultant will include assisting the Team Leader in :

(i) listing, analyzing, prioritizing, and explaining in detail all of the significant barriers, in Bhutan which are preventing the wide scale spread of mini-microhydro systems throughout Bhutan. These could potentially include:

- mini/micro hydropower technology packages are not currently commercially produced on significant scale in Bhutan;
- limited manufacturing base for mini/micro hydropower systems given limited effective demand and limited ability to pay;
- lack of significant field demonstration of mini/micro-hydropower systems;
- limited ability of the village community to manage and maintain the mini/micro-hydro power systems;
- limited ability to pay for the energy services for commercial viability;
- limited involvement of entrepreneurs in producing mini/micro-hydropower systems for rural applications;
- financial viability not yet established on a significant scale;

trained manpower to plan, implement and monitor mini/micro-hydropower system do not exist on a significant scale

The International Consultant should determine possible benefits from linkages with the

regional expertise developed at the Regional Center for Mini and Micro Hydro (INSHP) in Hang Zhou, China, an internationally recognized institution of excellence in small hydro development.

Analysis of detailed maps and site inventories in order to undertake a site assessments

(ii) identifying ways of overcoming these barriers detailed in (i) above, including full assessment of the risks involved and likelihood of success. Given the likely existence of a large number of barriers, it is unlikely that any single project will lead to the removal of all of them. Therefore, it is likely that a programme / project which leads systematically through the gradual elimination of the barriers finally identified will be developed from the GEF mission. The assessment of how best to overcome these barriers will be developed into a strategy to ensure financial sustainability of the project beyond its lifetime. In a sequential manner, therefore, it is estimated that the proposed project would:

- estimate the scope for micro/mini hydropower schemes that are not being implemented in Bhutan due to the existence of barriers, and the contribution of these projects to the mitigation of greenhouse gases;
- propose specific measures to reduce these barriers;
- demonstrate the sustainability of micro/mini hydropower projects after GEF support has ended (following both barrier and removal), including demonstrations of cost recovery;
- estimate the overall financial requirements and time horizon;
- analyze and highlight the potential impact of the project in dealing with the issue of market penetration.
- show how the programmatic benefits will be monitored and the subprogram evaluated; and
- estimate the potential global benefits (both short-term and long-term) of this approach.

(iii) The international consultant will assist the Country Office to identify potential sources of project cofinancing.

(iv) Under the guidance of the Resident Representative, the international consultant will determine the scope of the present activity in light of UNDP's longstanding initiatives in micro hydro development

6. In elaborating the project brief, the international consultant will :

a) Finalize the technical assistance required for all project components; indicate measurable performance indicators for each TA component.

b) It is anticipated that GEF incremental funds would be linked to baseline funding for the total cost of the project and that the GEF project would only be developed for submission for GEFOP in the event that significant co-financing becomes available. The international consultant will identify specific activities to be funded by GEF, UNDP (IPF), and potential sources of co-funding. Given the operational strategy, there is scope for GEF to fund the "incremental" component of this project.

c) Incremental GEF funding is estimated at (\$5-6 million) for the full project for activities which would not reasonably be expected to take place without UNDP-GEF support and could not reasonably be expected to be undertaken as part of Bhutan's baseline activities in the energy sector, (and are not covered by other initiatives).

The International Consultant will, based on the GEF incremental cost calculation procedures, calculate the final incremental costs. Specific activities funded by GEF could include all components of the project related to building endogenous capacity, improving public awareness and demonstrating and disseminating the technologies through rural Bhutan.

d) Baseline funding will be determined on the basis of providing costing for activities in this proposal that the Royal Government of Bhutan could reasonably be expected to undertake in support of its objectives in the energy sector and which, in the absence of GEF support, could reasonably be expected to be funded by the Government. The International Consultant should assist to identify additional baseline co-financing from UNDP (IPF), other sources. The International Consultant will calculate and flesh out in detail these activities in elaboration of the project document.

e) The project document should explicitly reflect the process to be followed during the project execution. The interministerial complementarity and line of reporting should be spelled out explicitly in the document, and preferably reflected in an organogram.

f) Prior to departure from Bhutan, a local Project Appraisal Committee (PAC) meeting, to review and appraise the draft project document will be held with the relevant staff of the UNDP Bhutan office. The International consultant will be responsible for incorporating the minutes of the PAC into the document prior to forwarding the document to UNDP Headquarters. The International consultant will be responsible for revising the project brief/document to reflect all comments provided by GEF Bilateral, GEF Council, Technical Reviewers, etc.

Timing:

- National Consultant 1 month (8 days prior to arrival of Team Leader and International Consultant, + 10 days accompanying mission team, + 4 days follow up)

E. The outputs of the GEF mission would include:

- a draft GEF project brief under operational programme #6 of the GEF climate change operational strategy in standard GEF project brief format (including full incremental cost annex) to be presented at local PAC (LPAC) prior to end of mission; a revised draft GEF project brief incorporating the comments of the LPAC to be delivered to UNDP Bhutan and RBAP/GEF within 10 days of completion of mission)by last week of Dec. 1997)
- revised project brief incorporating relevant concerns raised by the technical reviewers within one week of receipt of all technical comments.
- a draft UNDP project document incorporating the comments of the local PAC and technical reviewers by end Dec. 1997

- A one page summary description attached to the draft project brief/document as an annex which responds to the concerns of the GEF Bilateral, GEF Council and technical reviewers and explains how and where in the project document they have been taken into account.
- A brief mission report including names and titles of all persons contacted/meetings with relation to the mission, processes and discussion.

8. All documents, i.e. (i) project document and (ii) mission report etc. , need to be submitted as follows:

- One master copy of each document in non-stapled form;
- electronic version on 3.5" diskette using WordPerfect 5.1 Software for each project brief/project document.

COSTS: To be negotiated by UNOPS to cover costs as follows:
Honorarium - anticipated 1 month; possible in-country travel /DSA, etc.

DURATION: End of mid December - End of Jan. 1998.