THE WORLD BANK/IFC/M.I.G.A.

OFFICE MEMORANDUM

DATE: March 28, 2002

TO: Mr. Ken King, Assistant CEO, GEF Secretariat
Att: GEF PROGRAM COORDINATION

FROM: Lars Vidaeus, GEF Executive Coordinator 

EXTENSION: 3-4188

SUBJECT: **Burkina Faso: Energy Sector Reform Project**
Work Program Inclusion - Resubmission

Please find enclosed the electronic attachment of the above mentioned project brief for work program inclusion, which addresses comments received from the GEF Secretariat dated March 21, 2002 on the project brief that was submitted for the Work Program Submission on March 11, 2002. GEFSEC comments (in italics) have been discussed at a bilateral meeting on March 25, 2002 and addressed as follows (complements the written response to comments sent to GEFSEC on March 25, 2002):

1/ M&E. There are some indicators on page 5 and in Annex 4 for the GEF household solar component, but no indicators for rural institutional consumers and productive uses. As per the work program entry requirement from concept review, indicators are needed for income generation and social benefits. And there are no indicators at all for either the household or institutional solar components in the project design summary Annex 1. The brief also needs an overall M&E plan

See revised Annex 1 (Page 29 to 33) and Annex 4 (Page 57 to 59). Additional indicators have been incorporated accordingly. The Overall M&E approach is described in revised Annex 4 page 42, 56 and 59.

2/ Sustainability. Solar home system subsidies. Starting at $4/watt for small system, these are very high relative to other GEF solar home system projects and the incremental cost analysis of $2/watt. Further, subsidies at the end of the project remain quite high--either $1.50 or $2.00, which does not instill confidence in a sustained market. This issue is made more difficult by the lack of a defined exit strategy in the brief, at this stage of project preparation. Also, in the table on page 38 it is not clear what <u>ranges</u> of system sizes qualify for the initial starting subsidy levels (in $/watt)?

Both the issues of the level of subsidies and the exit strategy beyond the lifetime of GEF support have been discussed, clarified and addressed in the revised Project Brief: (i) level of subsidies, see revised tables in Annex 4 page 48-49,and (ii) Sustainability/ GEF exit strategy, see revised section on sustainability in Annex 4, page 55-56.
The issue of "cut off" between "medium size" SHS and "small systems" is discussed on page 50.

3/ *Consultation, coordination. The Bank-provided technical assistance for cross-sectoral development, business support, resource assessments, and training seems appropriate. What happens to this project if the parallel UNDP project does not go forward at the same time? What elements from UNDP are necessary or desirable for the Bank projects' success?*

Guiding directions for the upcoming UNDP operation have been detailed in Annex 4, pages 52 to 54. Coordination and consultation between UNDP and World Bank are defined in Annex 4, pages 42 and 54.

4/ *Policy framework and lessons. There is no recognition in the lessons section of recent GEF lessons for solar home systems on the policy side, particularly the need to delineate in rural electrification planning and policy where grid extension will occur and where solar home systems will be employed (see "The GEF Solar PV Portfolio", August 2000). And this issue is not addressed in the "minimum policy platform" in Annex 3.)*

It is not possible at this time to make such delineation. First, in a country with such low grid electricity access, and small electricity service demands, expectations of grid extension are not realistic (unlike Argentina, Chile or Sri Lanka, for instance). PV systems are not necessarily in competition with grid supplies; even within a particular geographic area, a 'commercial approach' to grid service provision means that a grid distributor may well find it worthwhile to incorporate PV service as a part of his/her supply plan. The project will encourage grid distributors to do so under a 'fee-for-service' plan. (That is, the 'fee-for-service' model will be approached only in the context of combining grid and PV services; if that succeeds, stand-alone 'PV only' fee-for-service models may become viable as well.) From the consumers' perspective, the commercial approach also means that even were grid extension to occur, it would not imply the implicit cross-subsidies under the uniform national tariff approach, and that the price of grid supplies would reflect the costs, with only a limited implicit cross-subsidy (within a concession area, for instance). There is no compelling rationale to set aside an area for 'PV only', because PV and grid supplies do after all serve very different enduser markets. This is why the 'minimum policy platform' is technology neutral, emphasizing just 'level playing field' and 'smart' subsidies. Also see revised section D –2, page 20 concerning reference to lessons learned.

Please let me know if you require any additional information to complete your review prior to inclusion in the work program. Many thanks.

cc: Messrs./Mmes. A. Covindassamy, R. Senou, N. Desai (AFTEG), C. Crepin, R. Kini, JM. Pavy (AFTES); R. Khanna, S. Wedderburn, D. Aryal, M. Sharma, A. Mathur (ENV); ENVGC ISC, Relevant Regional Files

PROJECT BRIEF

1. IDENTIFIERS:

PROJECT NUMBER	069126
PROJECT NAME	**Burkina Faso: Energy Sector Reform Project**
PROJECT DURATION	4 Years
IMPLEMENTING AGENCIES	World Bank
EXECUTING AGENCIES	Ministry of Mines, Quarries, and Energy, Government of Burkina Faso
REQUESTING COUNTRY	Burkina Faso
ELIGIBILITY	Burkina Faso ratified the UN Framework Convention on Climate Change on September 2, 1993
GEF FOCAL AREA	Climate Change
GEF PROGRAMMING FRAMEWORK	Operational Program 5: removing barriers to energy efficiency and energy conservation; Operational Program 6: promoting the adoption of renewable energy by removing barriers and reducing implementation costs.

2. SUMMARY: GEF assistance is requested in co-financing investment, technical assistance, and capacity building for promotion of renewable and energy-efficiency technologies (RETs/EETs). These activities are a part of a larger Energy Sector Reform Project (ESRP) under preparation by the World Bank. The development objectives of the ESRP are to reduce electricity costs to the Burkina economy, and to expand peri-urban and rural populations' access to electricity services. The key rationale for GEF co-financed interventions – which help generate carbon emission reductions – in the context of a broader thrust in power sector reforms and electricity access expansion strategy is to place RET/EETs on a stronger footing for competition against more conventional alternatives, thus moving the economy to a lower-carbon energy development trajectory. The project seeks to do so via a 'learning by doing' barrier removal strategy – beginning with supporting a 'critical mass' of solar PV businesses and helping drive down the local investment and implementation costs. It will also support technical assistance and capacity building efforts for introducing grid-capable RETs in the energy supply mix over the longer term. The key risk is that small market size, limited absorptive and implementation capacity, and the weak status of local financial markets would limit the potential for a rapid scale-up of RET/EETs over the longer term. Careful monitoring and evaluation (M&E) is therefore critical to define an exit strategy as well as a scale-up strategy.

3. COSTS AND FINANCING: (MILLIONS US $)

GEF PDF Financing

PDF/B World Bank	0.090
Total, GEF PDF financing	***0.090***
Proposed GEF support	
World Bank	3.200
Subtotal GEF	3.200

CO-FINANCING (GEF co-financed component only)	
IA: World Bank (with other donors)	9.100
Government of Burkina Faso	1.300
Private sector	1.900
Subtotal, Cofinancing (GEF co-financed component only)	***12.300***
Sub Total Costs	**15.590**
ASSOCIATED FUNDING	98.900
Total Program Costs	**114.490**

4. GEF OPERATIONAL FOCAL POINT ENDORSEMENTS:

Name : Kambou J.P.
Title : Adviser to the Minister for Environment & Water
Organization : Ministry of Environment and Water
Date : 03/07/02

5. IA CONTACT:

Christophe Crepin, Regional Global Environmental Coordinator, Africa Region,
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BURKINA FASO

ENERGY SECTOR REFORM PROJECT

Project Concept Document

Africa Regional Office
Africa

Date: March 1, 2002	**Team Leader:** Richard Senou
Country Manager/Director: David Craig	**Sector Manager/Director:** Ananda Covindassamy
Project ID: ID-P069126	**Sector:** PP - Electric Power & Other Energy Adjustment
Lending Instrument: Sector Investment Loan (SIL)	**Theme(s):** Economic Growth and Improved Competitiveness
	Poverty Targeted Intervention: [] Yes [X] No

Project Financing Data

[] Loan [x] Credit [x] Grant [] Guarantee [] Other [Specify]

For Loans/Credits/Others:

Total Project Cost (US$ 114.4 m)

Cofinancing: The African Development Bank (AfDB), about US$10 million;

DANIDA (about US$ 10.8 million, of which $8 m for interconnection line);
French Development Agency (about US$ 10 m for Interconnection line);

GEF (US$3.2 million)
Others(about US$ 3.5 million);

Total Bank Financing (US$ 61.2.m)

Borrower: Government of Burkina Faso
Guarantor: Government of Burkina Faso
Responsible agency: Ministry of Mines, Quarries and Energy (MMQE); National Electric Power Company (SONABEL) for the Electricity Component, and Ministry of Industry and Commerce (MIC).
Project implementation period: 4 years
Implementing Agencies: The Reform Program Implementation Unit (RPIU) located within the MMQE; The Privatization Unit located within the Ministry of Industry and Commerce (MIC)
Contact person: Director General of Energy, General Manager of SONABEL
Address:
Tel: Fax: E-mail:

A. Project Development Objectives

1a. Project development objective: (see Annex 1)

The overall project has two **development** objectives, consistent with the Burkina Faso Country Assistance Strategy (CAS) and the Poverty Reduction Strategy:

- To improve the competitiveness of the economy via rationalizing electricity supplies on the SONABEL system; and,

- To improve the quality of life and enhance the productive potential of underserved populations via expanding the peri-urban and rural access to electricity services.

The project seeks to achieve these objectives via reforms of the legal, institutional, and regulatory structure for electricity sector, and facilitating competitive private sector participation. The project will also finance investments in the main and independent grids to facilitate imports of cheaper power and to expand grid-based electrification, in electricity demand management (DSM), and in solar PV systems.

On the main SONABEL grids, supply cost reduction will come via interconnections (between Ouagadougou and Bobo-Dioulasso, proposed under this project, and with Ghana, under the proposed West Africa Power Market Development Project), and end-user cost reduction from improvements in end-use efficiencies. The decline in cost alone would not, however, automatically lead to expansion of electricity access. Access expansion will be supported via the main grid – facilitated by privatization of SONABEL with access mandates, and by competitive entry in the distribution market – as well as via independent grids and off-grid technologies such as solar PV systems.

1.b *Global Objective*:

The proposed global environmental objective is to initiate the process of eliminating the barriers to the widespread adoption of renewable energy technologies, in particular solar photo-voltaic (PV) in rural and peri-urban areas, and the more efficient use of electricity, primarily in the main grid. The global environmental objective would contribute to a reduction in greenhouse gas (GHG) emissions via displacement of kerosene or diesel that would otherwise have to be used for lighting and electricity generation (see Annex 4 for a detailed description of the GEF co-financed activities and associated incremental costs of global environmental benefits).

2. Key Performance Indicators (See Annex 1)

- Bobo-Ouaga interconnection operational;

- Reduction in bulk supply costs in the interconnected grid by at least 50% compared to January 2002[1];

- Energy Sector Regulator (possibly as a part of a multi-sectoral regulatory scheme) fully operational to oversee privatized SONABEL and SONABHY and other private entrants in the electricity and petroleum sectors;

[1] Average reduction in retail tariffs in the (proposed) interconnected system (Bobo-Ouaga, in turn connected to Cote d'Ivoire and later Ghana) may not be the same as that in bulk supply costs because of the capital costs of network expansion, anticipated changes in customer composition, and proposed 'access levy' to partly finance the Universal Access Fund. Also, supply costs and tariffs will be higher in the isolated grids than in the interconnected grid. Service costs for PV are not comparable to those for grid supplies.

- Universal Access Agency/Fund fully operational, with support for on-grid and off-grid electricity suppliers for access expansion;

- Increasing access to electricity in rural and peri-urban areas for about 80,000 families (4.5% of the population) by 2006;

- Number of solar PV systems installed and maintained, and consumer satisfaction with them;

- Increase in the number of viable solar equipment distributors who can provide reliable post-sales service;

- Reduction in costs of solar PV systems; and,

- Reduction in peak and total energy demand in the Ouagadougou system under a demand side management (DSM) program

B: Strategic Context

1. Sector-Related Country Assistance Strategy (CAS) Goal Supported by the Project: (see Annex 1)

Document number: 15740-BUR Country Assistance Strategy of the World Bank Group for Burkina Faso, November 03, 2000 Date of latest CAS discussion: November 30, 2000

The central objective of the CAS is to support the Government's efforts, as described in the Poverty Reduction Strategy Paper (PRSP 2000-2002), to achieve sustained high growth rates, reduce the high incidence of poverty, and improve the nutrition, health, and education of the rural population, which constitutes the largest group among the poor. The CAS focuses on supporting policies and programs aimed at improving the supply side of the economy to allow for sustained, broad-based and export-oriented growth. The PRSP acknowledges that sustainable poverty reduction requires not only rapid growth, but growth that offers increased access to economic opportunity by the poor and growth that is environmentally sound. In preparation for the PRSP and CAS, discussions with the Government and civil society have focused on the low competitiveness of the economy, due in part to the high cost of infrastructure services. In turn, this is the result of the country's landlocked situation, the inadequate management of sector institutions and less than optimal investment decision-making.

The Government has been implementing since 1991 a wide range of economic reforms under a series of stabilization and structural adjustment programs. Its 1995 Letter of Intent for Sustainable Human Development Policy laid out a vision of transforming the economy via liberalization of internal and external economic relations. By late 2000, several key policy measures – covering fiscal reforms, financial sector reforms, privatization of many public sector enterprises – were implemented; the economy has also enjoyed relatively steady economic growth in recent years (average of 5.7% p.a. from 1996 to 1999, driven primarily by strong agricultural performance).

The Poverty Reduction Strategy adopted in 2000 is based on four key aims: (i) accelerating broad-based growth; ((ii) ensuring the poor's access to basic social services; (iii) expanding opportunities for employment and income generation for the poor; and, (iv) promoting good governance. The Government's action plan focuses on three priority sectors: health, education, and rural development (including investments in rural infrastructure).

The proposed project is one of the several mutually supportive Bank operations to help meet the twin goals of improving the competitiveness of the Burkinabè manufacturing sector and supporting broad-based growth and social service expansion (in particular, health, education, and water). For instance, recognizing that full implementation of sectoral strategies will require major improvements in public sector management, the Bank has employed programmatic lending in the form of Poverty Reduction Strategy Credits (PRSC I in FY 2001, PRSC II in FY 2003), which incorporate several key elements for energy sector policy reform and development of a rural electrification strategy. The access expansion portion of the proposed project also seeks to build potential synergies with Bank investment projects in other sectors – e.g., proposed Basic Education project and Competitiveness and Enterprise Development project, and recently approved Community-Based Rural Development project. That is, recognizing that increasing electricity access only provides the supply side of the equation for reaping the development gains from electrification, the proposed project would also support assistance to rural small and medium enterprises and local social institutions (agriculture, health, education, and water) on how best to use the newly available electricity to improve their business. In this way, the project seeks to emphasize the catalytic nature of electricity in transforming in the rural economy.

1.a Global Operational Program Objective Addressed by the Project: (Annexes 1 and 4)

The project will address Operational Program 5 on Removal of Barriers to Energy Efficiency and Energy Conservation (via adoption of energy efficiency technologies or EETs) and Operational Program 6 on promoting the adoption of renewable energy technologies (RETs) that will substantially reduce greenhouse gas (GHG) emissions via removing barriers and reducing implementation costs. GEF support will help to (a) remove information and awareness barriers; (b) reduce the initial costs of solar PV systems; and (c) prepare a strategy for sector development that supports renewable energy and promotion of energy efficiency technologies (EETs) as appropriate (see Annex 4 for a detailed description of the GEF co-financed activities for the promotion of low-carbon technologies and associated agreed incremental costs).

The key rationale for GEF co-financing of interventions in the context of a broader strategic thrust for power sector reforms and electricity access expansion is to place lower-carbon technologies – and associated supply and intermediation chains – on a strong, sustained footing for competition against more conventional alternatives, thus moving the economy to a lower-carbon energy development trajectory. The project seeks to do so via a 'learning by doing' barrier removal strategy – beginning with supporting a 'critical mass' of solar PV businesses and helping drive down the local investment and implementation costs. It will also support technical assistance and capacity building efforts for introducing grid-capable RETs in the energy supply mix over the longer term. The key risk is that small market size, limited absorptive and implementation capacity, and the weak status of local financial markets would limit the potential for a rapid scale-up of RET/EETs over the longer term. Careful monitoring and evaluation (M&E) is therefore critical to define an exit strategy as well as a scale-up strategy.

2. Main Sector Issues and Government Strategy

The existing Burkina power sector serves essentially the modern, urban part of the economy - primarily small industries, service sector, and relatively rich households - via two medium-sized grids, Ouagadougo and Bobo, and several small, isolated grids. As a small, landlocked, largely agrarian economy with few energy resource of its own, Burkina developed its power sector relying mostly on high-cost imported petroleum fuels. During the 1990s, while seeking to reduce reliance on thermal generation using imported fuels, Burkina invested in domestic hydroelectric capacity (against Bank advice) that has - somewhat predictably - turned out to be much less reliable than originally hoped for. (For instance, only a third of the installed 13 MW capacity is available during the dry season.).

The combination of continued reliance on high-operating-cost thermal generation and the debt service requirements of the hydro investments gone somewhat sour has meant that the utility finances have been kept manageable only with high retail tariffs - indeed the highest in the region, and among the highest in the world for a comparable size utility. At the same time, as economic conditions have improved, the demand for even this high-cost electricity has continued to soar - at an average rate of about 7 % p.a. from 1995 to 2000. The publicly owned utility SONABEL has not been able to invest in new capacity, though a recently completed interconnection of the Bobo grid to Cote d'Ivoire has led to relieving the capacity constraints on at least a part of the system; the imports have also lowered the overall SONABEL costs somewhat (with the reduction in operating costs due to Côte d'Ivoire interconnection being at best about 20% of the total operating costs of SONABEL, which is negated by the financing cost of the transmission line). On the Ouagadougou grid, however, peak demand is projected to exceed available capacity beginning this year.

In short, the power sector has been caught in a high-cost 'low equilibrium trap' for some time, and the recent economic and electricity demand growth now threatens to tighten this trap. High electricity costs in turn contribute to low competitiveness of the Burkina manufacturing sector (both domestically and with its trading partners), and reduce the amount of resources that could otherwise be spent on productive investments. High costs also mean that even within the grid-supplied urban areas, it is difficult to expand the market necessary to exploit economies of scale. Cost reduction would help accelerate sector growth and make it more equitable, and raise the long-term growth potential of the economy. In the near-term, the capacity deficit on the Ouagadougou system risks raising the cost to the economy even more -- since unserved demand from connected customers leads to loss in output, whose value is much higher than the lost revenue to the utility.

Finally, as a landlocked country with high delivered cost of petroleum products, high electricity costs, and with a favorable solar resource regime, RETs and EETs have an advantage in Burkina Faso, and even more so for the rural areas where provision of liquid fuels or electricity may be prohibitively expensive. Despite several donor-supported initiatives, however, RETs/EETs adoption is constrained by a variety of informational and marketing/financing barriers. Small local markets – i.e., excluding the donor-supported initiatives – mean the prices of RET/EETs are much higher than the world market levels.

Given this context, there are four inter-related challenges in Burkina power sector, two requiring immediate attention and two of 'short-term' nature: (i) meeting the near-term generation deficit on the Ouagadougou System; (ii) lowering costs of supplies through improving system operations and investing in lower-cost imports; (iii) adopting a new paradigm for access expansion in peri-urban and rural areas, while improving the implementation capacity of various actors; and, (iv) creating a supporting institutional framework to attract new resources to meet the growing absorptive capacity of the economy.

Current status and recent developments on these challenges are described below:

- ***Generation Deficit.*** With power consumption in Ouagadougou already uncomfortably close to the existing 80 MW peak generating capacity, a peak power deficit is expected to arise by no later than 2002 (a deficit of 10 MW is foreseen for the upcoming dry season that has started in March 2002, see Annex 2 on the 2001 – 2006 Demand projection table), and perhaps sooner, taking into account the unreliability and high operating costs of existing plants. Therefore, even after allowance for losses reduction, additional capacity is needed (about 30 MW, see Annex 2) well before the interconnection with neighboring countries can be effective, around 2005-2006. Even after interconnection, this additional capacity would be needed for backup and reserves, replacing the current old generators. The near-term capacity and generation deficits also argue for an aggressive emergency demand side management (DSM) program on the Ouagadougou grid, and a Danida study is currently being prepared to design such a program.

- ***Lowering the Cost of Supplies and Use.*** *As* shown in the table below, Burkina Faso has the highest electricity tariff in sub-Saharan Africa (about US cents 21/kWh). This is the result of the country's landlocked situation, government interference in state-owned company (SONABEL) management leading to poor investment decisions and inadequate collection policies. SONABEL is not managed according to commercial principles. It receives poorly targeted government subsidies in the form of lower fuel cost (via SONABHY) and capital grants. Despite these subsidies and high electricity tariffs, SONABEL does not generate profits. Its performance in collecting revenues from both private and public consumers is poor with only about 62% of energy billed are collected. Because of the deterioration in its financial situation, SONABEL has neglected the maintenance of its facilities in recent years. This in turn has led to an increasingly unreliable supply of electricity and to high technical losses. Overall, less than 50% of energy produced is paid for, contributing to high costs and pressure on government budget. High tariff rates provide another justification for pursuing an aggressive DSM program; in effect, the low-voltage (LV) industrial and commercial customers, including the GoBF – who pay their bills – compensate for SONABEL's high technical and revenue losses.

Country	Average household	Social tariff	LV Industry	Access Rate % of Households
	US cents/kWh			
Ghana	5.14	3.38	7.44	35
Côte d'Ivoire	8.52	5.00	5.54	20
Togo	10.68	10.55	10.95	12
Benin	12.44	10.41	11.22	13
Mali	17.95	14.84	18.12	11
Burkina Faso	**20.87**	**16.25**	**23.45**	**9**
Cf. average Europe	8.14	5.68	8.73	99.9

Source: CIE-EDF

Until recently, loads in the country's main cities – Ouagadougou, the capital, and Bobo-Dioulasso – were too low to justify the cost of interconnection with neighboring countries. However, with peak demand in the order of about 80 MW in Ouagadougou and 20 MW in Bobo-Dioulasso, and system growth of about 7 percent annually, regional interconnections have become an attractive option. Bobo-Dioulasso has just been connected to the Ivoirian grid through a line which can provide up to 100 MW at about US cents 5.5 per kWh. The French Development Agency (FDA) is financing the feasibility of extending this line to Ouagadougou. This interconnection will significantly lower the operating costs of supplies to what would become the main SONABEL grid. In order to avoid heavy reliance on a single supplier (Cote d'Ivoire), the GoBF is also planning an interconnections with Ghana. The Bank would act as the last resort financier in co-financing the Bobo-Dioulasso – Ouagadougou transmission line with DANIDA, the French Development Agency, the AfDB, and others donors. It is further expected that the Bolgatanga (Ghana) – Ouagadougou interconnection will be funded under the West Africa Power Market Development Project, currently under preparation.

- ***Adopting a New Paradigm for Access Expansion***: As the table above shows, only 9 percent of Burkinabe households have access to electricity. Furthermore, electricity consumption is particularly low (about 22 kWh per capita per month) due to low availability and high costs. The

Government is keen on extending infrastructure services rapidly, and has set a target of service to about 80,000 families, or 560,000 people or an additional 4.5% of the population by 2006, as part of its Poverty Reduction Program. In recent years, some isolated grids have been installed, and a significant program of village "solar electrification" has been implemented. It is obvious, however, that even meeting the GoBF target for 2006 would still mean that access expansion would fall behind the general population growth rate, and even farther behind the urbanization rate.

Recent experience with residential sector sales on SONABEL's main grid as well as isolated grids has shown that there is a ***considerable unmet demand*** for electricity, and that introduction of grid supplies in certain 'pockets of affordability' appears to enhance affordability, leading to significant growth in electricity sales. The experience with the 'village solar electrification' program – whereby over 100 villages were provided with solar PV systems for some street lighting, community centers, health clinics and schools, and administrative offices – has shown that the availability of electric lighting has major impacts on the quality of life of rural populations and the ***quality of public services.*** These findings are also born out by recent surveys and market assessments in studies financed by Danida and others, and point to the need, and the room, for introducing ***new delivery approaches*** for electricity access expansion. Recognizing this, the GoBF and the Bank have reached agreement on a new paradigm for sector and access expansion (see next section). In the proposed restructuring of the power sector, the long-term sector vision for rural electrification is for SONABEL successors to continue to provide urban service and to continue expanding in rural areas where financially viable. In parallel, other project sponsors from the private sector, cooperatives, NGOs, local government, etc., would also build, own, and operate rural electricity schemes. These would be energized through bulk supply from the national grid or independent generation – primarily diesels but also including renewable energy where appropriate. Solar PV systems are ideally suited to meet demands too distant and too small for financially viable grid electric services.

- ***Creating an Institutional Framework to Attract New Resources***: In 1998, the Parliament adopted a new Electricity Law aimed at breaking SONABEL's distribution monopoly. However, this law suffers from four major deficiencies. First, it consecrates SONABEL's monopoly position over the sector by maintaining it as single buyer and system operator. It allows for the entry of only one independent power producer (IPP) that would have to sell its entire output to SONABEL and limits private initiatives to only a few areas which are not within SONABEL's mandated area of operations. Second, the law gives too many discretionary powers to the GoBF, with an inter-ministerial committee setting tariffs, and little responsibilities to an independent regulator. Third, under this law, the power system would essentially remain in state hands, with no guarantee that any other private operator could generate and distribute electricity, since SONABEL remains the only legal buyer of any electricity that may be generated independently. Finally, the law failed to set-up an independent Regulatory Authority. The GoBF is therefore currently preparing plans to privatize SONABEL, introduce a new electricity law that corrects these deficiencies, establish an appropriate regulatory framework for private sector participation in the generation and distribution of electricity, and to increase access to electricity services.

3. Sector Issues to be Addressed by the Project and Strategic Choices

The project will address all four challenges faced by the power sector via investments and technical assistance/capacity building activities. Among investments, in cooperation with other donors, it will finance (a) the implementation of additional capacity to meet the generation deficit in the Ouagadougou system; (b) the construction of Bobo-Ouagadougou transmission interconnection line; (c)

investments in access expansion via multiple service delivery modes – the main grid, independent grids, and off-grid systems such as solar photovoltaics (PV); (d) an electricity demand side management (DSM) program on the Ouagadougou system.

The design principles for the overall project reflect several inter-related ***strategic choices***:

a) **Combining power sector reforms with rural electrification and promotion of lower-carbon energy paths in a single project**: This choice reflects judgment that access expansion and environmentally friendly sector development paths need to be squarely put forth as legitimate goals in the sector reform process. The alternative, of 'retrofitting' a policy framework initially geared solely to parastatal privatization with another, subsequent round of policy and institutional changes for additional objectives and goals, is neither practical nor efficient.

b) ***A new paradigm for access expansion***: In the context of sector restructuring and expansion as contemplated, it is necessary to develop a commercially-oriented, institutionally viable program to expand electricity access specifically targeted at underserved areas, breaking away from the "business-as-usual" unsustainable approach relying exclusively on high-cost transmission line extensions and heavy implicit cross-subsidies across regions and customer classes. The principles of this new paradigm are encapsulated in a 'minimum policy framework' (see Annex 3) adopted by the GoBF in its Letter of Energy Sector Development Policy (December 2000), and consist of (i) a Level Playing Field for Private Sector Participation; (ii) an Enabling Regulatory Framework; (iii) Cost-recovery and Cost-based Tariffs for regulated grid supplies; and (iv) a 'smart' Subsidy Transfer and Financing Mechanism. Compared to the 'business-as-usual' approach to electricity access expansion – which leads to high-cost/low-revenue investments with heavy implicit cross-subsidies so that only a few can benefit – this new paradigm seeks to:

- lower costs, by promoting competition, using standards (distribution and generation) more appropriate to rural areas, and design/construction approaches in capital projects, and improving operational efficiencies (in the case of renewables, adopting appropriate standards and establishing service and maintenance networks);

- increase revenues, by (a) employing cost-based distribution tariffs, (b) promoting income-generating uses of electricity, and (c) selectively exploiting cross-sectoral synergies to build new demands;

- employ "smart" subsidies, i.e., subsidies that are explicit and transparent, limited in advance, and are judiciously selected and designed to reward performance in access expansion and building future loads. These are expected to consist of capital grants to lower the transaction costs and/or initial customer service connection costs in such a way as to provide continuing incentives for cost-minimization and scaling up. In turn, this means avoiding, and beginning to entirely do away with, implicit (and operating) subsidies that lead to waste and non-accountability, and provide strong disincentives for expansion of access.

- maximize indirect benefits of access, so that people who are not initially able to afford access under a commercially-oriented approach still benefit from the improvements, through electricity service provision, in the quality of other services such as education (e.g., adult literacy, vocational training) and health (e.g., lighting and refrigeration for rural health facilities and vaccination programs).

Taken together, these four prongs – in a policy and regulatory environment consistent with the 'minimum policy platform' that provides appropriate incentives for market expansion and taking risks – are expected to provide a workable model for financial sustainability that can be scaled up subsequently.

c) **Exploiting the 'policy space' of broader economic reforms and re-direction of public expenditures for selective 'cross-sectoral' market development**: The choice of working via multiple delivery mechanisms, primarily via private sector reflects the judgment that economic reforms that create greater private sector role in the economy (via privatization of parastatals, not just in electricity supplies but those that are significant customers of electricity) and put "hard budget constraints" on public sector agencies, provide an opportunity to develop *commercial* approaches to access expansion and access expansion as well as promotion of lower-carbon energy paths. In other words, it reflects a hope that the business environment of Burkina Faso over the next five years and beyond would be substantially different from that ten years ago, and that, as economic reforms take hold, broader *absorptive and implementation capacity* will develop to help create *private income generation* catalyzed by expansion of electricity access. Within the Bank, GEF, and other donors' investment projects that are traditionally sector-focused, there is a need to work 'cross-sectorally', e.g., to selectively build and exploit synergies via coordinated investments in rural education, health, and water supply facilities. Rural electrification in general, and RET-based electricity service provision in particular, also offers opportunities for local employment in installation and maintenance. The project provides for training and capacity building for the 'cross-sectoral' partner ministries as well as SMEs. (See Annex 4 for details).

d) **Building on other donors' efforts and establishing a sustainable policy and institutional framework to enable later 'scale up':** Several bilateral and multilateral donors have been engaged in assistance to the Burkinabe energy sector over the years, and recently their technical assistance has focused on power sector reforms, decentralized rural electrification, and promotion of RETs and EETs. (For instance, the PV 'village electrification' and 'water pumping' projects mentioned above.) The proposed project here seeks to build on these efforts and bring the Bank/UNDP 'value added' in terms of placing the RET/EET promotion within a well-defined policy and institutional approach (whose principles are outlined in the 'minimum policy platform' in Annex 3). Additionally, the project will explore opportunities for institutional mechanisms for multi-donor, multi-project and/or multi-country 'market facilitation' largely outside the scope of this project and over the longer term. The idea is to bring together the learning of sub-project design, implementation, and M&E across different projects and to strengthen the 'entry points' for capacity building within Burkina Faso (across different donor projects) and in the region (including Mali and Mauritania, where similar Bank/GEF projects are being prepared). Such a 'market facilitation network' (MFN) could be an efficient and effective means to develop replication strategy in what are otherwise fairly small projects and country markets, with high overheads and transaction costs. It could also help develop timely indicators of 'warning signs' for projects under implementation as well as of new demands for investments and financing across different RET/EETs and customer groups.

C: Project Description Summary

The proposed project will have two main components: **(a)** an investments component for : (i) a system rationalization including a contribution to the Bobo-Ouaga interconnection line; a private sector driven development of critical generation capacity; and a demand side management (DSM) program covering RE activities to provide access to about 80,000 families; and (ii) access expansion including main grid intensification; independent grids and solar PV systems; and **(b)** an institutional strengthening

/capacity building component designed to cover sector restructuring studies and regulatory setup; public and private sector training programs; and RE/EE promotion program.

1. Project components: (see Annex 1)

	Indicative costs (US$m)	Bank Group (US$m)	GEF (US$m)	GoBF and others (US$m)
Investments:				
System rationalization				
Bobo-Ouagadougou interconnection	$ 40.0	$ 15.0		$ 25.0
Emergency/backup capacity for Ouagadougou	$ 25.0	$ 10.0		$ 15.0
Demand Side Management Program	$ 5.0	$ 3.5	$ 0.5	$ 1.0
	$ 70.0	**$ 28.5**	**$ 0.5**	**$ 41.0**
Access Expansion				
Main grid 'intensification	$ 20.0	$ 16.0		$ 4.0
Independent grids	$ 6.0	$ 5.0		$ 1.0
Solar PV systems	$ 6.7	$ 3.6	$ 1.4	$ 1.7
	$ 32.7	**$ 24.6**	**$ 1.4**	**$ 6.7**
subtotal, investments	**$ 102.7**	**$ 53.1**	**$ 1.9**	**$ 47.7**
Institutional Strengthening/Capacity Building				
Sector restructuring studies; regulatory setup	$ 5.0	$ 4.0		$ 1.0
Public and private sector training programs	$ 3.0	$ 2.0		$ 1.0
Promotion program for Low -carbon Technologies	$ 3.7	$ 2.0	$ 1.3	$ 0.4
subtotal, IS/CB	**$ 11.7**	**$ 8.0**	**$ 1.3**	**$ 2.4**
TOTAL	**$ 114.4**	**$ 61.1**	**$ 3.2**	**$ 50.1**
Memo: subtotal GEF co-financed activities	$ 15.4	$ 9.1	$ 3.2	$ 3.2

Bobo-Ouagadougou interconnection ($40 million)

To extend the benefits of cheaper power imports from Bobo to the Ouagaadougou grid, this component would co-finance a 375 km transmission line between the two cities. Currently the transmission line from Ferkésédougou (Cote d'Ivoire) to Bobo (Burkina Faso) has the capacity to carry 80 MW, though only 20 MW is being brought in to meet the Bobo load. The Bobo-Ouagadougou interconnection will thus also improve the capacity utilization of the Ferkésédougou-Bobo line.

Emergency/backup capacity for Ouagadougou (US$10 million of a Partial Risk Guarantee)

To help meet the emergency capacity needed while the Bobo-Ouagadougou transmission line is being constructed, the GoBF is planning to purchase about 30 MW from an IPP of capacity plus associated energy. An IDA Project Preparation Facility (PPF) advance is currently financing consultants in preparing bidding documents and draft Power Purchase Agreement (PPA). The PPA would address the relative risks of different provisions – duration of the contract, quantum of energy, price for capacity and energy, incentive payments for efficiencies, etc. – and propose several alternatives for negotiation.

Demand Side Management Program ($5 million)

This component will finance the investment and technical assistance plan for reducing about 12 GWh (or about 12% of the total) of electricity consumption – worth about $1.6 million per year to the

Prime Ministry (which directly pays all electricity bills to SONABEL) – in the public sector buildings in Ouagadougou. These investments would be in both air-conditioning and lighting systems (including those for replacement of existing equipment, and changes in procurement for additional equipment) and in related training and awareness measures. These investments have a relatively short pay-back period at the current tariff rate – shorter still if the economic costs of captive generation or of unmet demand in the overall Ouagadougou system are considered – and are economically justifiable even with the projected tariff reductions from interconnection of the Ouagadougou grid with Cote d'Ivoire or Ghanaian supplies. A small amount of GEF support is warranted in the process of initiating awareness building, policy development, and capacity building for the local equipment supply and maintenance businesses. (See Annex 4 for details).

Main grid intensification ($20 million)

The purpose of this component is to demonstrate that with low-cost technical options and cost-based tariffs, it is possible to interest private businesses (investors and commercial financial institutions) to accept the commercial risks of independent grid electrification investments, while the Government provides the appropriate enabling environment. This component, which will focus on adding new customers to existing SONABEL main and isolated grid networks will be implemented primarily by the SONABEL successor company. It will also seek to support additional private businesses in extending service to new areas and supplying through bulk purchase from the grid. Through the grant co-financing support of the Universal Access Fund, project monies would leverage the necessary commercial funding for this intensification effort.

Independent Grids ($6 million)

Parallel to the previous component, this component is intended to demonstrate the viability of private development and operation of grid networks not connected to the main grid, including both generation and distribution. This component will be implemented by the private sector for selected towns and other relatively concentrated areas with a potential for income-generating uses of electricity. These areas could be grouped through site profiling for competitive concession contracts with private owners/operators covering several of these demand centers. Independent grid suppliers will be offered capital subsidy through the Universal Access Fund on a competitive basis, subject to pre-specified criteria for service quality and household access.

Solar PV Systems ($6.7 million)

This component will open up the institutional (health clinics, schools, NGO posts, and private businesses) market for solar PV systems to local competitive procurement, and to establish the financial, technical, and business development intermediation mechanisms for local suppliers. It will support cash purchases of institutional-size solar PV systems as well as smaller household-size solar PV systems. Financial intermediation would be via the Universal Access Fund for channeling GEF/bilateral grants. If commercial banks show interest, an on-lending window to re-finance consumer credit extended by private solar PV dealers may be considered during the course of project preparation.

(i) One part of the program would be directed at meeting efficiently all the modern energy needs of rural institutional consumers, such as health clinics and schools, and initiate the process by providing light, cooling for vaccines and electricity for other appliances via solar PV systems. This would be a "cash market" by private suppliers, with the bulk of financing coming from donor-supported investment programs in the education and health sectors (as well as GoBF

budgets for these sectors under the PRSP), and the remainder from GEF grant support under this project;

(ii) The other part of the program would aim to provide solar home systems for lighting and TV or lanterns to rural households and small commercial users, by private solar PV dealers on commercial terms with some subsidies. Qualifying solar PV dealers would receive competitive subsidy support, and may be able to refinance consumer credit. A suitable financing scheme will be designed.

See Annex 4 for more details.

Sector Restructuring Studies and Regulatory Setup: ($5 million)

In preparation for privatization of SONABEL, several privatization options including concessions, and even affermage, and market structures, involving the unbundling of the sector activities, will be analyzed. Before privatization is initiated, however, it is essential to establish an appropriate regulatory framework and start reducing losses with the implementation of the loss reduction program to be financed through the proposed project, so as to make available more resources to finance the maintenance of the facilities.

Public and Private Sector Training Programs($3 million)

Building on the "minimum policy platform will be three "pillars", all of which are needed to ensure a solid footing for the program. These pillars: (i) business development; (ii) financing; and (iii) subsidies, are described below. Key actors in building and implementing this approach will be the MMQE, several new entities proposed in the new electricity law (Sector Regulator, Universal Access Agency, and Universal Access Fund), private and other equipment and service providers including SONABEL's successors, customers, financial institutions, and donors.

a) **Business Development** – Project sponsors must be assisted in preparation of bankable rural electrification projects. Plans must include financial, management, administration, technical, marketing, and regulatory aspects within a framework which emphasizes long-term sustainability of the project. The importance of solid, practical business plans and the ability to implement them cannot be understated. Especially in the early phases of the Rural Electrification program, when new structures are yet untried, development of such plans will help to guide program development, as practical problems and solutions are worked through. Also, the success of initial private RE projects will have a strong demonstration effect. Well run private projects will go a long way towards reducing perceived risks in this new business area.

b) **Financing** – A key benefit of engaging the private sector is the injection of debt and equity beyond what the Government is able to provide. Optimal risk allocation between the project sponsor and financial intermediary is needed. However, existing FIs are cautious to enter this new market given the high perceived risks. Even in light of subsidies to be made available – see next section – FIs approached during pre-appraisal remain hesitant to participate. Options for supporting the participation of local financial institutions include liquidity extension and/or some form of guarantee.

c) **Subsidies** –The long-term nature of rural electrification investments significantly constrains the private sector's appetite. However, recognizing that electricity is a necessary element for rural development, Government seeks to offer incentives to encourage such private investment as described in the policy framework. These would be administered primarily in the form of output-

based grab=nts based on: (i) system commissioning and (ii) energy sales, after which RE schemes must be able to operate commercially. There is a temptation to subsidize operating costs as well as initial costs to ensure that even very poor households will have potential access. However, this temptation should be avoided since it would make each private RE scheme dependent on annual government budget allocations – a risky approach given the heavy demands on the Government's limited budget.

Promotion Program for Low-Carbon Technologies($3.7 million)

Technical assistance would consist of studies for resource assessments for grid-capable of RETs. Capacity building activities would consist of:

- Resource assessment for grid-capable RETs for bulk supplies for distribution;
- Assistance in 'cross-sectoral' market development and in promoting income-generating applications of decentralized RETs;
- Supply chains strengthening and business support; and,
- Training programs.

This sub-component also includes portions of the implementation costs and monitoring and evaluation (M&E) for the GEF co-financed activities. Details are in Annex 4. In parallel, the UNDP is developing a GEF co-financed program of technical assistance and capacity building that could consist of the following initiatives. (The UNDP/GEF project will be developed under an approved PDF/B grant to the Government of Burkina Faso. A full Project Brief will be developed by mid-2002, in coordination with the World Bank/GEF initiative.)

A. Market assessment for biomass-based power generation and cogeneration;
B. Identification and facilitation of rural enterprise opportunities combining renewable energy applications with economically productive activities
C. Pilot program in rural energy infrastructure extension services
D. Support to combat theft and trafficking in stolen PV modules and related equipment
E. Training to lending institutions such as Caisse Populaire on financing RET investments

While the Bank/GEG and UNDP/GEF activities share the same vision but are not interdependent in execution, the key linkage between the two is as follows: the UNDP/GEF activities aim to (i) expand the scope of the rural and renewable energy program to other technologies, via technical and institutional pilots; (ii) help promote the productive and private income generating activities with the use of renewable energy technologies; and (iii) help meet the demands for human resource capacity generated by the Bank/GEF activities. Put another way, the Bank project via macro institutional changes and support for renewables-based electricity access expansion options is expected to create grass-roots level need for capacity, and the UNDP/GEF activities are expected to be so tailored as to meet the diverse capacity needs that will become clearer only during the course of actual implementation of the Bank/GEF sub-component.

2. Key policy and institutional reforms to be sought:

(See Sections B.2 and B.3)

3. Benefits and target population:

The primary benefits of the project investments would be: (a) avoiding the loss of output from supply outages in the Ouagadougou system; (b) lowering the costs of bulk supplies to the main SONABEL grids (to be interconnected during the project); (c) contribution to the improvement in quality

of life and quality of public services, and to broad-based economic growth, by access to electricity. The target population is all the current customers of SONABEL, plus other such customers that would be connected to the main grid or existing/new independent grids, plus those who would benefit directly from acquiring solar PV systems or indirectly by the improvements in service quality of rural public institutions. The structural reforms and new institutional framework supported by the project will bring new resources to the power sector, expand the menu of delivery models, and enhance the capacity of small/medium enterprises to engage in electricity supply and enduser servicing businesses.

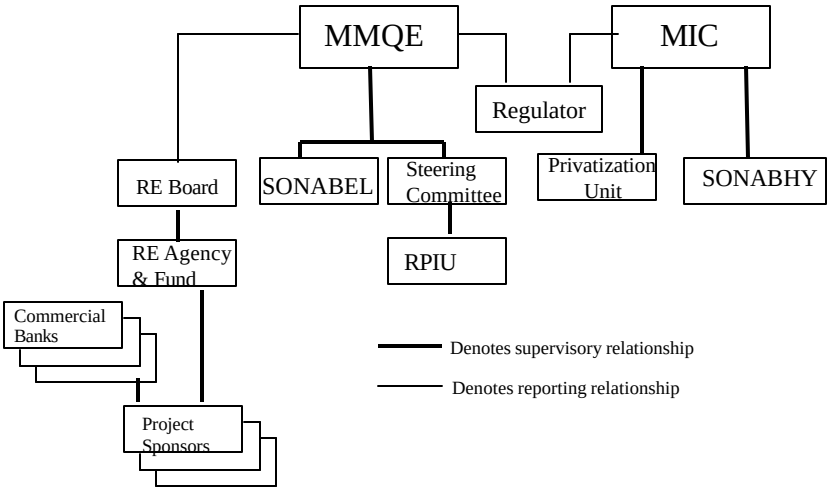
4. Institutional and Implementation Arrangements:

The implementation arrangements for the 4-year project will emphasize bolstering capacity in institutions which will have a long-term presence in Burkina. The overall responsibility for coordinating project implementation will lie with a temporary Project Implementation Unit (PIU) linked to the Ministry of Mines, Quarries, and Energy (MMQE). The MMQE will implement the technical assistance package and the overall project monitoring and evaluation. SONABEL or its successor will implement the transmission line and capacity purchase investments.

The project will also institute, on a permanent basis: (i) an **Energy Sector Regulator** (Autorité de Régulation), independent of the MMQE in its operations, and perhaps in conjunction with regulatory authorities for other infrastructure sectors such as water and telecom), to implement the new rules for customer services and retail prices for providers of electricity as well as petroleum products; and (ii) a **Universal Access Board**, with the Universal Access Agency (Agence d' Accès Universel) as a secretariat and a **Universal Access Fund** (Fonds d'Electrification Rurale, as the subsidy transfer mechanism), for implementation of the technical assistance, capacity building and investments related to peri-urban and rural access expansion. The Energy Sector Regulator and the Universal Access Board will have a large degree of independence in the implementation of their respective project components, with the temporary PIU role limited to that of providing administrative services.

Implementation of parallel programs of other donors is yet to be defined, but is expected to be carried out by the agencies as proposed here. The articulation between the different agencies and units in charge of the project and reforms implementation will be more clearly defined during the course of project preparation.

Project Institutional Arrangements



5. Reporting and Procurement:

The RPIU will submit to the World Bank quarterly reports on progress in implementing the project. A project implementation plan, including a procurement plan, will be formulated during project preparation and agreed during negotiations. All procurement will be done in accordance with IDA guidelines.

6. Financial Management, Reporting and Auditing:

The RPIU will be responsible for project financial management, including the preparation of annual financial statements, in accordance with internationally accepted accounting practices. It will monitor all disbursements under the credit and ensure that they are in conformity with IDA requirements. Before credit effectiveness, the project financial management system will be reviewed to ensure compliance with IDA procedures. Project accounts will be audited according to international auditing standards by an independent accounting firm to be selected under terms and conditions satisfactory to IDA. The recruitment of an auditor for SONABEL, SONABHY as well as the project accounts will be a condition for credit effectiveness.

7. Monitoring and evaluation:

The project seeks to develop a participatory M&E design that integrates M&E as a project-based 'management information system' and learning tool, and not just a data collection and reporting tool. A proper M&E system can help increase the beneficiaries' 'ownership', strengthen the hands of emerging 'champions' among the investors and financiers, and provide 'leading indicators' of problems and new opportunities. Evaluation will focus first on the creation of institutions (e.g. Universal Access Agency and Universal Access Fund) which conform with international best practices. On the investments side, the evaluation will focus on cost of providing services, capacity to pay for services, and economic and social

activities generated by new connections. That is, the emphasis would be on understanding the pathways for direct and indirect impacts of electricity access and developing appropriate matrices that are easy to collect, applied in a timely manner for project implementation and post-project arrangements to ensure sustainability.

GEF co-financing here will be utilized in a strategic manner so as to initiate the process of removing barriers to RET/EET adoption, with the aim of accelerating this process by the end of the project. There is a need to develop a M&E protocol that meets the GEF interest in RET/EET market development indicators as well as the GoBF, the Bank, and other donors' (including those supporting investment programs of other ministries) interest in other indicators (for instance the developmental impact of electricity access via solar PV for rural health, education, or water supplies.) Therefore, it is proposed that toward the end of the project preparation process, and as part of the overall M&E design for the project, a 'Prototype M&E Protocol' be developed for the GEF co-financed components. This prototype would be based in part on detailed subproject-level quantitative and qualitative assessments of outcomes and impacts, and may be used to provide triggers for an 'exit strategy' – if project progress is unsatisfactory – or a 'scale-up strategy' – if project progress is highly satisfactory. See Annex for details.

D: Project Rationale

Project alternatives considered and reasons for rejection

The decision to include promotion of renewable energy and energy-efficiency technologies (REETs) in the Burkina Faso market and initiate the process of eliminating market barriers to these technologies was based on the judgment that the Bank can and should exercise leadership in this arena, building on previous small-scale work by a variety of grant donors. It also reflects the judgment that these technologies are an economically and environmentally superior choice for certain end-users.

Alternative instruments to the SIL were considered. These were: i) an APL, which was rejected because the pace and extent of power sector reform is not yet sufficient to reasonably establish the need for, and scope of a longer-term, multi-project program; ii) a LIL, which was rejected because of the need for capital investment to meet the project objectives; and iii) a SAL, which was rejected because structural adjustment was not viewed as the key issue to address at this stage and handled in part under PRSC II.

1. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned):

There has not been a Bank-assisted energy project in Burkina Faso for the past 16 years. The design of the proposed project is based on other energy, power, and rural electrification projects in African countries that have been completed, ongoing or in the preparation stage.

Sector issue	*Project*	**Latest Supervision (Form 590) Ratings (Bank-financed projects only)**	
		Implementation Progress (IP)	**Development Objective (DO)**
Bank-financed			
Grid-based rural electrification			

Sector issue	*Project*	**Latest Supervision (Form 590) Ratings** **(Bank-financed projects only)**	
		Implementation Progress (IP)	**Development Objective (DO)**
Bank-financed			
Uganda Energy for Rural Transformation		Recently approved	
Mozambique Energy Reform and Access Program		Under preparation	
Ghana National Electrification (P000953)		S	S
Vietnam Rural Electrification		Under preparation	
Independent mini-grids			
Uganda Energy for Rural Transformation		Recently approved	
Mozambique Energy Reform and Access Program		Under preparation	
Mozambique Urban Household Energy Project		S	S
Sri Lanka Energy Service Delivery Project		S	S
Laos Southern Province Rural Energy (P044973)		S	U
Solar pv			
Uganda Energy for Rural Transformation		Recently approved	
Mozambique Energy Reform and Access Program		Under preparation	
India Renewable Energy Development I			
Indonesia Solar Home Systems (P035544)		U	U
Sri Lanka Energy Service Delivery (P010498)		S	S
Sri Lanka Renewable Energy for Rural Economic Development		Under preparation	
China Renewable Energy (P046829)		S	S
Togo-Benin Rural Energy (P057881)		Under preparation	
Argentina – Renewable Energy Rural Markets (P006043)		S	S
Mexico – Offgrid Rural Electrification (P064848)		Under preparation	
Bangladesh		Under preparation	

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

2. Lessons Learned and Reflected in Proposed Project Design:

- ***Reform programs for state enterprises should take place within a well-defined energy policy framework, have the full backing of the Government, and move at a pace tailored to the country situation.*** GoBF has adopted a comprehensive energy sector development policy in December 2000. It has indicated its commitment to sector reforms that will promote competition and private sector participation in the electric and hydrocarbon sub-sectors. Further preparation of the reform program takes account of the realistic time frame for implementation. The agreed reform program and its implementation is expected to take about three years, by which time the follow-up investment operation should be ready for Board presentation.

- ***Community ownership and private enterprise are key aspects of successful rural electrification programs.*** Government-based electrification projects tend to be expensive and not sustainable. Where communities (NGOs and local entrepreneurs from the local communities) have been involved in ownership and control, projects have been less costly, more tailored to meet their needs and therefore results have been more successful. They also have provided opportunities for the creation of new electricity supply companies. Given the encouraging results in other

countries, and the fact that the approach has worked well in Burkina Faso for traditional energy programs, it will be applied in the proposed project's rural electrification component.

- ***Giving priority to consultation with the Government, beneficiaries, and stakeholders is crucial to ensuring a viable project design.*** Under the proposed project, extensive consultations are planned with all parties that will potentially be involved, as reflected by the Sector Policy Letter; government agencies, non-governmental organizations, businesses, unions, consumers, and villagers.

- ***Promotion of renewable energy and energy-efficient technologies (REETs):*** Significant resources are required initially to lower the barriers that impede greater use of these technologies. These include for instance, resource assessments and energy use audits, strategy papers, demonstration schemes, training, and building broader awareness of distribution of REETs as a viable retail business. At the same time, such nominally "upstream" activities, if carried out in isolation and without links to a program of actual procurement and use of, do not lead to market development. To the contrary, a viable investment financing program helps "learning by doing" and improve the quality and impact of such "upstream" activities. This project aims to build on prior projects by other donors and develop a coherent program of sustained knowledge and financing support for the promotion of these technologies. By doing so, it is expected that the cost of these technologies can be brought closer to those in the world market.

  As noted in a recent paper reviewing World Bank/GEF solar home systems projects, "Most World Bank Group projects are relatively new and offer little implementation experience so far." and "Commercial sustainability and replication of business models has not yet been achieved or conclusively demonstrated in any World Bank project." (Eric Martinot, R. Anil Cabraal, and Subodh Mathur, "World Bank/GEF solar home systems projects: experiences and lessons learned 1993-2000", Renewable and Sustainable Energy Reviews Vol. 5, p. 39-57). The authors conclude that, "solar home systems delivery firms face a myriad of difficulties operating in rural areas: credit risk is a serious concern of both financiers and dealers and makes credit sales particularly challenging; technical performance of systems is becoming well-proven; customers desire a range of component options and service levels and can benefit from even small systems; projects must recognize the link between rural electric-grid extension and solar home system demand; and marketing campaigns can be extremely costly and time consuming in rural areas."

  Also as pointed out in a review of the EU-financed, Regional Solar Program (PRS, 1989-98, largely for water pumping, but also for community PV systems), the after-sales service market can be a significant source of revenue for the sustainability of the local PV businesses, and the financing of these services must be ensured, especially for institutional customers. (CILSS Coordination Regionale du PRS, "Regional Solar Programme – Lessons and Perspectives", December 1999, Ouagadougou, Burkina Faso.)

  The project design philosophy takes these cautions into account in that a significant part of the solar PV investments here are proposed for the public sector institutional market, in part building on the history of the PRS and the Burkina Faso "Solar Village Electrification" project, financed on IDA terms by the Spanish aid agency. By making the government a significant player on both the financing as well as the enduser side of the PV market, the credit risk is significantly lowered if not eliminated, and government resources (from non-energy ministries – e.g., health, education, and rural development) are brought to bear upon the supply chain for after-sales service and ancillary markets. While technical performance of solar PV systems is well-proven in Burkina, the institutional and business service arrangements have some way to go before a strong constituency is built within the Government and other stakeholders. The success of the proposed

project is expected to lead to a stronger commitment by the Government to continue to support the key niche role of the PV industry beyond the end of the project.

3. *Measures Already Taken*

Letter of Sector Development Policy outlining proposed reforms has been approved at both the technical and the Government levels (adopted by the Counsel of Ministers on December 28, 2000). The Parliament has voted 0n July 21, 2001 the Law authorizing the privatization of SONABEL and the opening of SONABHY' s capital to private partners.

4. *Value Added of Bank/GEF Support:*

A number of bilateral and multi-lateral donors have been engaged in all areas of the energy sector for a long time, while the Bank has not been engaged in the electricity sector for nearly two decades and only mildly in the woodfuels sector. The key to overcoming the sector's persistent and worsening problems is a wide-ranging liberalization, which will in due time contribute to the competitiveness of the economy through a reduction of the electricity supply cost in the main grid, and expand electricity access to peri-urban and rural populations. The Bank's expanded role at this point is critical in (a) helping achieve a sharply higher development impact of aid via leading donor coordination in a program of policy and regulatory reforms, and (b) supporting the aims of Poverty Reduction Strategy and macroeconomic reforms as agreed with the donors and the government, by providing donors with effective grant funding channels *and* building selective cross-sectoral partnerships.

The Bank can bring in the knowledge and experience in energy sector reforms and privatization, and in emerging best practices in the area of expansion of electricity access, to these shared goals. Looking forward, the Bank's knowledge assistance would be geared at fostering a consensus – among the Burkinabe and the donors – toward new approaches to sector development and maximizing aid effectiveness, in order to achieve a broad, sustainable development impact of aid-financed investments.

The GEF's value added goes beyond the grant support provided by it. While there have been a number of donor-supported renewable energy activities in Burkina Faso, their impact has been generally limited to the actual projects supported. GEF's support would make it possible to develop a more programmatic approach, within which individual projects could be developed via:

- Linkage of technical assistance and investments to CAS strategic objectives for improved competitiveness of the economy and reduction of poverty.

- Focus on sustainability of investment project benefits through the establishment of commercial principles, supporting institutional framework to ensure efficient operation and management, and building the local private sector and community-level capacity. .

- Use of GEF funds in a strategic, catalytic manner to integrate promotion of lower-carbon technologies in access expansion programs, and in turn to the sector restructuring, drawing upon a broad base of Bank/GEF experience worldwide and similar projects elsewhere in sub-Saharan Africa (e.g., Uganda, Mozambique)

E: Issues Requiring Special Attention

1. Economic

[x] Summarize issues below (e.g., fiscal impact, pricing distortions)
[ ] To be defined (indicate how issues will be identified) [] None

Inadequate investments in the past have contributed to a high cost of electricity. A loss (25%) reduction program and a revenues collection (between 62 and 65%) improvement plan, as well as an arrears recovery plan need to be formulated and implemented rapidly to reduce the cost of electricity in the short-term. Over the medium-term, interconnection with neighboring countries is also expected to lower significantly the cost of electricity. A least cost program is being prepared and will be discussed and agreed upon during project preparation. Well before the interconnection is completed, however, additional generation capacity is needed to meet a fast growing demand. A series of measures will be designed to reduce the peak load. The rural electrification program must be developed on the basis of a sound economic analysis. In short, in the absence of significant experience with rural electrification in Burkina Faso, and none with cross-sectoral links, it is difficult, at this time, to obtain reliable estimates of two key elements of the economic benefits: the consumer's surplus and the indirect benefits. These tasks, including the manual of procedures to provide guidance for economic analysis of individual projects, will be undertaken as part of the preparation of the RE component of the project, building on the development of a "benefit assessment method (now being developed for the Philippines) designed to improve valuation of benefits from rural electrification. Preliminary results from this study show that potential economic benefits from RE are much higher than the benefits measured by financial revenues, and far exceed the costs of rural electrification.

Economic evaluation methodology:

[ ] Cost benefit [x] Cost effectiveness [x] Other [specify]

Least-cost planning.

2. Financial

] Summarize issues below (e.g., cost recovery, tariff policies, financial controls and accountability)
[ ] To be defined (indicate how issues will be identified) [] None

SONABEL accounts do not reflect its cost structure. A loss- and arrears- reduction program will be implemented as a first priority to strengthen SONABEL's operations and finances prior to restructuring and privatization. Electricity tariffs need to reflect financial accountability through the most suitable option resulting from the discussions on the study to manage SONABEL's operations. The project will finance an accounting and financial audit of SONABEL to get a better understanding of its condition and establish the bases for its evaluation in connection with its privatization. Through an IPP for additional generating capacity, financing of capacity charge is being considered under the proposed operation. The disbursement for these capacity charge would be closely monitored. An appropriate scheme is being developed to enable SONABEL to use the installed capacity in a financially sound way during the interim period (before the interconnection is effective).

The Universal Access Fund may be established in close coordination with the Telecommunications Fund proposed under the Competitiveness and Enterprise Development project, currently under preparation. One of the key issue for rural electrification and renewable energy development is the need for a workable financial intermediation. Term financing at an affordable rate is critical for private sector rural electrification project to be successfully developed. Without it, the tariff rates would make the project financially unviable. Mitigation measures, based on experience in sub-Saharan Africa, would include efforts to finance rural electrification and renewable energy development as part of normal functioning of the financial sector (avoid introducing distortions in the financial sector). These measures would further take account of barriers and gaps (liquidity mismatch and risk perceptions) when providing interim financial mechanisms, with a clear exit strategy. A study is being carried out to define the modalities for this mechanism and its finding and recommendations are expected to be discussed during appraisal and introduced at the earlier stage of project implementation.

3. Institutional

[x] Summarize issues below (e.g., project management, M&E capacity, administrative regulations)
[ ] To be defined (indicate how issues will be identified) [ ] None

The most critical issue is the definition and setting up of a regulatory mechanism for the energy sector. A Regulatory Authority (ARTEL) has been established for the telecommunications sector, and will be supported by the proposed Competitiveness and Enterprise Development project. The regulatory agency for the energy sector will be patterned after ARTEL, with some adjustments to reflect the differences between sectors, including water, petroleum products). A merging of these two agencies is a distinct possibility for the medium-term. In the immediate future, however, the Government prefers the solution of separate agencies that would each develop its own experience. The National Committee for Privatization will be actively involved in the privatization of SONABEL and SONABHY. Its capacity has been strengthened with Bank support over past years. The decision making process, which used to be overly complex, has been streamlined recently. In designing the areas of responsibilities between SONABEL and its successors and the Universal Access Agency, assurance will be sought to clearly delineate the areas of intervention of each institution (see para. 2.3 and 2.5). Institutional arrangements for the Universal Access Fund (including oversight of the Fund activities by its Board) will help ensure that it meet local communities expectations in a sound and efficient way.

The MMQE is still a weak institution. The project will help the Ministry focus on policy formulation and monitoring through technical assistance, which will contribute to reinforcing the role of the Ministry in that area by mainstreaming traditional energy issues.

4. Social

[x] Summarize issues below (e.g., significant social risks, ability to target low income and other vulnerable groups)
[x] To be defined (indicate how issues will be identified) [ ] None

The main social issues are: (i) the most suitable way to organize participatory rural energy development (sensitization, information and education campaigns, public meetings; and consultations with consumers on differentiated tariffs related to local costs of supply; (ii) the social impact of privatizing SONABEL and possible related redeployment of its staff; and (iii) collection of base-line data and development of measurement system to evaluate impact. These issues will be addressed under the proposed project. The social impact of installing additional power capacity through IPP, as well as the social implications of the rural energy component and the traditional energy‘s fuel substitution/transformation sub-component will be assessed under the project and corrective measures will be implemented.

5. Environmental

a. Environmental issues:
[**X**] Summarize issues below (distinguish between major issues and less important ones)
[ ] To be defined (indicate how issues will be identified) [] None

The project is expected to be assigned an Environmental Category A due to its expected potential environmental impacts. For the Bobo-Ouaga power transmission line component of the project for which an environmental assessment is being carried out under the FDA’s financing, a field reconnaissance screening evaluation by Bank environment specialists is required to determine the predominant land use along the right of way and whether any protected areas lie along the proposed alignment. Based on this screening terms of reference (TORs) will be prepared to serve as the basis for the review of the EA study mentioned above and the preparation of the required environmental and social impact analysis. This analysis will confirm which of the Bank's policies apply. Specifically, it needs to be determined whether

the Natural habitats and Involuntary resettlement policies apply. The findings and recommendations of the existing EA report will also be used in this process. The principal mitigation measure of the impact of the transmission line would consist of a careful siting of the transmission line alignment trough low density development area with an objective to avoid significant natural habitats. The mechanisms of community outreach along the Bobo-Ouaga transmission line alignment are to be determined.

The proposed project's studies on rural energy and traditional energy's fuel substitution/transformation sub-components will identify, categorize, and assess any environmental issues, according to the Bank's environmental guidelines. The environmental assessment will review SONABEL's and SONABHY's compliance with international environmental standards prior to privatization. Detailed recommendations for improvement will be made. The assessment will also review the area which is being prepared for the new generating capacity.

b. Environmental category: [X] A [] B [] C

c. Justification/Rationale for category rating: A transmission line Bobo-Ouaga is expected to be financed should the ongoing feasibility study demonstrate its economic justification and viability.

d. Status of Category A assessment: EA start-up date: December 2001
Date of first EA draft: March 2002
Current status: Being prepared

e. Proposed Actions:

f. Status of any other environmental studies: the EA for the Bobo-Ouaga line is being done as part of the feasibility study expected to be available by end-November 2001.

g. Local groups and NGOs consulted (list names):

h. Resettlement

[ ] Summarize issues below (e.g., resettlement planning, compensation)
[ ] To be defined (indicate how issues will be identified) [ ] None

i. Borrower permission to release EA: [X] Yes [ ] No [ ] N/A

j. Other remarks:

7. Participatory Approach:

a. Primary beneficiaries and other affected groups:

While the Bank has not been engaged in the Burkina power sector for many years, several other donors' recent work has focused on developing new service delivery options for electricity access, especially Decentralized Rural Electrification studies. As the project preparation work advances, local population will be involved via three participatory meetings in the preparation of rural energy schemes, in coordination with the Universal Access Agency and its Board. They will help determine the demand for system access, the nature of the proposed programs, and the role they will play in the operation of these programs, as in the case of water supply activities. Also NGOs will be involved in the monitoring of the impact of these programs. he private sector and consumers will be represented in policy formulation in the energy sector through the Steering Committee. Consumers will be represented in the Regulatory Agency.

8. Checklist of Bank Policies

a. Safeguard Policies (check applicable items):

Policy		**Risk of Non-Compliance (H, M, L)**
X	Environmental Assessment (OD 4.01)	.
	Natural Habitats (OP/BP/GP 4.04)	
X	Forestry (OP 4.36)	
	Pest Management (OP 4.09)	
X	Cultural Property (OPN 11.03)	
	Indigenous Peoples (OD 4.20)	
X	Involuntary Resettlement (OP 4.30)	To be established by the EA
	Safety of Dams (OP 4.37)	
	Projects on International Waterways (OP 7.50)	
	Projects in Disputed Areas (OP 7.60)	

b. Business Policies (check applicable items):

X	Financing of recurrent costs (OMS 10.02)
	Cost sharing above country 3-yr average (OP/BP/GP 6.30)
	Retroactive financing above normal limit (OP/GP/BP 12.10)
X	Financial management (OP/BP 10.02)
X	Involvement of NGO's (GP 14.70)
X	Other (provide necessary details) Privatization

c. Describe issue(s) involved, not already discussed above:
NA

F: Sustainability and Risks

1. Sustainability:

With regard to rural electrification, long-term sustainability depends on the willingness and ability of the sector to change its delivery paradigm from that of a central, government-owned and operated agency (SONABEL) to a regulated, private-sector approach. For that to happen, GoBF will need to maintain a key planning and support role in the sector, while allowing the private sector the space to develop robust, financially viable and socially beneficial subprojects. A key aspect of this project will be to help all stakeholders define and embrace their roles within the restructured sector.

Another basic approach to ensuring sustainability under this project is to root service provision along commercial lines and introduce low cost technologies and processes, so that the incentive and ability to make profits makes it worthwhile for the service provider to continue in business. In addition, business development assistance would be provided not just in the initial stages of service provision, but also at critical growth junctures, so that increasing demand would not overwhelm the service providers.

A key strategic reason to choose to initiate EE/RE investments in the context of sector reforms and SONABEL privatization is to seek to ensure sufficient, gradual nurturing of the local markets and capacities so as to ensure the long-term sustainability of RE investments under the project AND acceleration of these investments beyond the period when GEF grants cease. The overall approach is that, over time, sustainability will come from barrier removal, cost reductions, rising incomes, and declining GEF grants. Also, as the Government plans to finance the Universal Access Fund via, for

example, a levy on grid-based electricity, the need for external grants to support electrification in general, or that via RE technologies in particular, will decline.

For solar pv systems, the decline in costs will come from: (i) economies of scale –which are often realized when a credible expectation of a large market has been created, (ii) formation of links to lower-cost suppliers abroad, and (iii) rising incomes, which will increase the affordability of the systems. Further, the GEF grant per unit for solar pv systems is also slated to decline over time.

Thus, the key assumptions underlying the viability and replicability aspects of both the rural electrification and RE/EE promotion aspects are that cost-reductions will be realized and incomes will rise. For instance, the GEF share of 20-25% in total costs, it is reasonable to expect that cost reductions and income increases over a number of years will offset the need for such support after the project is over. Additionally, the planned TA/CB activities will support 'learning by doing' and incorporating mid-term revisions and corrections along the way; taking care to reduce grant dependencies of individual sub-projects.

As one of the least-developed countries, Burkina Faso is expected to remain dependent on grant support from donors in social sector investments – e.g., health and education. To that extent, the expansion of the 'public institutional market' will remain indirectly dependent on donor support. The major change this project proposes in this regard is to incorporate 'electricity (and perhaps ICT) provision' as a routine part of budgetary processes of individual line ministries. Initially the PV sellers take the usual commercial risk that this portion of their market depends on the ability of the GoBF to fund public-sector social services. Over time, as their market grows and diversifies, this risk would become relatively smaller.

Critical Risks: (reflecting assumptions in the fourth column of Annex 1)

From output to Objectives	Risk Rating	Risk Minimization Measure
Capacity is not maintained for lack of appropriate human resources	M	Policy dialogue and donor coordination
Private sector is not prepared to invest	H	Information campaign early on/risk mitigation instruments with local banks, PRG. MIGA
Government interferes with Regulatory Agency	H	Insist on transparency of decisions and due process and structure, accountability, resources, appointment and tenure of the Regulator
Regulatory structure proves inadequate or functions poorly	H	Insist on transparency of decisions and due process, provide for financial as well as political autonomy of Regulatory Authority (appropriate framework and fund provided by sector operators)
Initial rural electrification investments not viewed as successful, undermining potential for future scale-up Proposed solutions for expanding access to electricity in rural areas are not viable	M	Provide ongoing support to initial sub-projts to ensure the attractiveness of the business; disseminate results (mode of operation of the Universal Access Agency) to future stakeholders; ensure that best practices world-wide are disseminated

Conditions in neighboring countries deteriorate	H	Avoid over dependency on a single neighbor for power supply
From Components to Outputs		
Consultants' performance is less than satisfactory	M	Close supervision and policy dialogue
Parliament is unwilling to revise legislation	M	Support government efforts to make its case to key parliamentarians
Donors do not support new policy framework	M	Work closely with donors to build consensus during project preparation
Staff of public enterprises concerned resist proposed changes	M	Design and implement a solid public information campaign
Rural communities are not extensively consulted on new schemes	M	Business Development. Support, including market awareness and early discussion w/ beneficiaries.
Overall Risk Rating	M	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

G: Project Preparation and Processing

1. Has a project preparation plan been agreed with the borrower:

[] Yes, date submitted : [X] No, date expected: 03/31/2002
2. Advice/consultation outside country department:
[X] Within the Bank: Quality Enhancement Review, Energy Sector Board
[X] Other development agencies: DANIDA, the French Development Agency, and other development agencies are expected to join the World Bank for the appraisal mission

2. Composition of Task Team:

Richard Senou, Task Team Leader
Helen Kofi, Procurement Analyst
Richard Cambridge, Operational Quality Support
Malcolm Cosgrove-Davies, Rural Energy
Yuriko Sakairi, Sr. Economist, GEF Specialist
Said Mikhail, Power Engineer
Paivi Koljonen, Sr. Energy Economist, Economic Analysis

3. Quality Assurance Arrangements:

A Quality Enhancement Review will take place when the first draft of the PAD is ready, in March 2002

ANNEX 1 PROJECT DESIGN SUMMARY

COUNTRY:BURKINA FASO

PROJECT TITLE: ENERGY SECTOR REFORM PROJECT

Hierarchy of Objectives	**Key Performance Indicators**	**Monitoring and Evaluation**	**Critical Assumptions**
Sector-related CAS Goal Alleviate poverty through, *inter alia:* improving the economy's competitiveness and people standards of living increasing income-generation activities promoting protection of natural resources**.** GEF Operational Program - Promote the adoption of renewable energy and energy efficiency technologies by removing barriers;	**Sector Indicators** Rural population has access to electricity services at affordable prices; Increased access of the rural population to electricity. Yield of forest resources is equal to or greater than annual forest off-take. - Size of the renewable electricity (non-hydro) contribution - Average end-use efficiency of new electrical appliances	Sector/Country Reports Country Assistance Strategy Progress Report - Project reports	**(from Goal to Bank mission)** GoBF is fully committed to its reform agenda, including improving competition, promoting private sector development, and empowering local communities Private sector management of natural resources allow for meeting wood requirements of the population in a sustainable way Promotion of lower-carbon technologies contributes to global environmental protection.
Project Development Objective Improve the competitiveness of the economy via rationalizing electricity supplies on the SONABEL system	**Outcome/Impact indicators** Cost of energy services is reduced (by about 35% for electricity); their reliability is improved; Pricing policy for electricity and petroleum products is rationalized;	**Project Reports** Progress reports	**(from Objective to Goal)** GoBF is fully committed to its reform agenda, including improving competition, promoting private sector development, and empowering local communities

			Economic conditions in neighboring countries are favorable Prices of BF's exports remain stable
To improve the quality of life and enhance the productive potential of underserved populations Global Objective:	Suitable framework for rural electrification established and ready for scale-up Number of households with access to grid electricity	Household survey reports Impact evaluation reports	Public and private stakeholders "buy in" to framework Sufficient affordability exists to purchase electricity services on a commercial basis
To initiate the process of removing the barriers and lowering the implementation costs of RE/EE technologies.	Increase in the number of viable PV distributors; % of new generation capacity using PV Availability of higher efficiency products and associated services in the market GoBF adoption of a low-carbon energy strategy and recommended actions	Project reports and surveys	The progress achieved will be sustained. There is sufficient human resource capacity to carry out the relatively new technical and commercial activities.
Output from each component: Overall Energy Sector	**Output Indicators**	**Project Reports**	**(from Outputs to Objective)**
A capacity for sector policy is established in MEM	MEM has taken a lead role in formulating and disseminating sector policy	Letter sent	Donors and private sector are willing to finance projects identified in development program
Independent regulatory authority is established	Authority is well staffed by 2004	Progress reports	Capacity is maintained through appropriate human

			resources policies Regulatory authority earns the respect of both consumers and the private sector
<u>Main Grid</u> A least-cost development plan for the power sub-sector is adopted	Plan is consistent with letter of sector policy		Conditions in neighboring countries allow for low-cost supply of energy products
Revised Electricity Law allowing for competition and private sector development is adopted; **Private ope rator(s) for the generation and distribution parts of SONABEL business is (are) selected** **A loss- and arrears - reduction program for SONABEL is implemented** **Additional generating capacity in place**	Law is enacted in 2002 Long-term contracts are signed before end-2004. SONABEL meets loss-reduction objectives for 2001-03 30 MW in place by 2004		Private sector is keen to fulfill its role Private sector operators are efficient
Cost-effective programs to increase electricity access to rural areas are adopted. Universal Access Fund operates effectively	Sound electrification schemes are financed 5 schemes financed by 2004 560,000 people or 80,000 families connected by 2007 Loads and demand densities in project areas Extent of cost	Independent grid operators' annual reports to the regulator. GoBF decrees on regulation. Customer satisfaction surveys.	Private sector willing to participate Local Financial Institutions willing to provide support Donor and Government programs are well coordinated

	reductions Indicators of quality of life and productive applications of electricity (TBD)		
Rural public institutions utilize PV systems Smaller PV systems or lanterns are sold in the market on retail basis, and/or are incorporated in the supply plans of independent grid concessionaires Retail distributors of PV systems increase and spread their reach geographically	Number and total size (kWp) of PV systems installed in rural public institutions. Indicators of service quality – health, education – improvements due to electricity access. Number and total size of smaller PV systems sold retail. Number and geographic dispersion of retail PV distributorships and after-sales service network. Preparation and adoption of future plans acceptable to the Bank and other donors. Prices of PV systems and after-sales services come down	Implementation and supervision reports of individual ministries. Market surveys for PV system prices and comparisons with price trends in other countries. Distributor/customer satisfaction and preference surveys. Supervision mission report Project implementation Report	High prices, absence of efficient supply and service chains are the key barrier to solar PV market development.
Installation of energy efficient air-conditioning and lighting systems, and application of associated awareness and training programs, in large public and private sector buildings.	Electricity usage and bills are reduced in large public sector and commercial buildings. Energy-efficiency standards are adopted. Firms providing energy audits and planning services for energy efficiency are		

	established and are viable.		
Project Comp./Sub-comp: **System Rationalization** *Bobo-Ouaga Interconnec.* *Emergency Capacity* *Demand Side Mgm Prog* **Access Expansion** Main Grid Intensificat Independent. Grid Solar PV Systems **Instit. Streng& Capa. Blg** Sect. Restruc. Studies Public/Private Sect Traini. RE/EE Promotion Program Total	**Cost (US$ million)** **70.0** 40.0 25.0 5.0 **32.7** 20.0 5.0 6.7 **11.7** 5.0 3.0 3.7 **114.5**	**Project reports** Quarterly Implementation Progress Reports	**(from Components to Outputs** Suitable staff is recruited; Strong public and private consensus on reforms Positive private sector response Wide participatory process (unions, rural communities) Institutional users are able to pay for PV system maintenance and replacement. Lower cost/smaller PV systems find a market. Retail distributors can import, stock, and sell PV systems without grant financing of working capital. Pockets of affordability exist, and will continue to grow over time. Human resource capacity constraints can be surmounted via training programs.

Annex 2

Table 1: Demand Projection for Ouagadougou (2001-2006)

	2001	2002	2003	2004	2005	2006
Peak	62.5	62.5	62.5	62.5	62.5	62.5
Center Ouaga I	5.0	5.0	5.0	5.0	5.0	5.0
Center Ouaga II	31.5	31.5	31.5	31.5	31.5	31.5
Center Kossodo	14.0	14.0	14.0	14.0	14.0	14.0
Center Hydro	12.0	12.0	12.0	12.0	12.0	12.0
TOTAL	**62.5**	**62.5**	**62.5**	**62.5**	**62.5**	**62.5**

Peak 2001: 65.6 – 66 MW May 10, 2001

	2001	2002	2003	2004	2005	2006
Growth Rate 8%	66.0	71.3	77.0	83.0	90.0	97.0
Deficit per year		9.3	6.0	6.0	7.0	7.0
Cumulative Deficit		9.3	15.3	21.3	28.3	35.3

This table has been prepared by the June, 2001 mission. A cumulative deficit of about 35.3 MW is shown in the table. However, for practical reasons, the mission, the donors (EU, AFD, and DANIDA) and the Government have agreed that a deficit of 30 MW is a more realistic figure to use. The details by center is provided in Table 2.

Table 2: Demand Projection for Ouagadougou
2001-2006

Ouaga I		**Age**	**Imp. Period**	**Inst. Period**	**2002**	**2003**	**2004**	**2005**	**2006**
25 years	G1	1991	2.5	2.7	2.5	2.5	2.5	2.5	2.5
	G2	1991	2.5	2.7	2.5	2.5	2.5	2.5	2.5
	G3	1978	1.0	1.2	--	--	--	--	--
	G4	1972			--	--	--	--	--
	G5	1998	2.5	Hors Service					
	G6	1998	2.5	Hors Service					
	G7	1998	2.5	Hors Service					
	G8	1998	2.5	Peak use	2.5	(2.5)	(2.5)	(2.0)	(2.5)
	TOTAL				**5**	**5**	**5**	**5**	**5**

Ouaga II			**Age**	**Imp. Period**	**2002**	**2003**	**2004**	**2005**	**2006**
100t/mm	G1		1975	(2)	--	--	--	--	--
500t/mm	G2	Rehab	1979	4	4	4	4	4	4
500t/mm	G3	Rehab	1978	4	4	4	4	4	4
500t/mm	G4	Rehab	1979	4	4	4	4	4	4
500t/mm	G5	Rehab	1982	6	6	6	6	6	6
500t/mm	G6	Rehab	1982	6	6	6	6	6	6
500t/mm	G7	Rehab	1999	2.5	2.5	2.5	2.5	2.5	2.5
500t/mm	G8	Rehab	1999	2.5	2.5	2.5	2.5	2.5	2.5
500t/mm	G9	Rehab	1999	2.5	2.5	2.5	2.5	2.5	2.5
TOTAL				31.5	31.5	31.5	31.5	31.5	31.5

Kossodo		**Age**	**Imp. Period**	**2002**	**2003**	**2004**	**2005**	**2006**
750t/mm		2000	3.0	3.0	3.0	3.0	3.0	3.0
600t/mm	BM (2x5.5 MW)	2000	11.0	11.0	11.0	11.0	11.0	11.0
TOTAL			14.0	14.0	14.0	14.0	14.0	11.0

Hydro	**Imp. Period**	**2002**	**2003**	**2004**	**2005**	**2006**
Kompienga (6 MW) Bagré (6 MW	12.0	12.0	12.0	12.0	12.0	12.0

ANNEX 3
MINIMUM POLICY PLATFORM
TO FACILITATE EXPANSION OF ELECTRICITY ACCESS IN UNDERSERVED AREAS

1. **Level playing field for private sector participants**. The Government will establish a market/sector structure that will:

   - **Permit private sector entry** for supply of electricity – generation, transmission, distribution/retailing – from the interconnected grid system as well as stand-alone, independent mini-grid systems.

   - **Ensure fair competition for all suppliers with respect to SONABEL and its successors.** In particular, all necessary steps will be taken to ensure SONABEL does not have an unfair advantage over potential private sector participants in competing for distribution/retailing of electricity purchased in bulk from the SONABEL-operated grid system. For example, SONABEL should not have an unfair advantage of being able to offer relatively low retail tariffs for a new distribution area, funded by an implicit cross-subsidy from SONABEL's existing retail operations.

2. **Enabling regulatory framework.** The Government will establish a suitable regulatory framework that has:

   - **Clear separation of responsibilities.** The Government will assign to separate departments the distinct responsibilities of: (i) planning, monitoring, policy setting, licensing and permits, (ii) establishing/promulgating regulations, (iii) compliance ("regulator"), and (iv) conflict/resolution, arbitration, and adjudication in cases where an involved party wishes to appeal a finding of the regulator.

   - **"Light-handed regulation" procedures and processes for small, stand-alone systems.** The Government will allow for simplified regulatory procedures and decentralized administration for small, stand-alone power systems.

3. **Cost recovery and cost-based tariffs**. The Government will permit full cost recovery and cost-based tariffs to facilitate private entry and local initiatives, recognizing that this will imply that consumers in different parts of the country will pay different retail tariffs, and that the tariffs for some consumers will be significantly higher than for others, even after some subsidies have been provided for (see also para 4). In particular, the Government will permit/establish:

   - **Regionally differentiated retail tariffs**, for all suppliers, including SONABEL and its successors, which vary according to the cost of service delivery.

   - **Bulk-supply tariffs based upon the cost of supply at the delivery point** in the main grid system.

   - **Non-discriminatory wheeling tariff (and access)** to facilitate power transactions between distribution concessionaires and third-party generators.

4. **Subsidy transfer and financing mechanism.** The Government will establish a subsidy transfer and financing mechanism – say, a Universal Access Fund – to take account of regional and other considerations, with due consideration to efficiency and sustainability under a regime of cost-based regionally-differentiated tariffs and multiple service providers in the future. In particular, the Government will design subsidy schemes and allocation procedures that:

- **Follow pre-established clear, explicit rules** that

  - ***Are transparent***, i.e., avoid implicit (and operating) subsidies that frequently lead to waste and non-accountability.

  - ***Are linked to results***, i.e., maintain the focus on expanding access by subsidizing the initial cost of investment rather than the cost of operation.

  - ***Provide strong cost-minimization incentives***, i.e., retain the commercial orientation to reduce costs even though subsidies are being provided.

and,

- **Ensure good governance**, i.e., the institutional responsibility for policy and rule setting for the, say, Universal Access Fund will be clearly separated from the administration of the Fund, and an independent entity will be responsible for requisite checks and balances, monitoring performance, and ensuring compliance.

ANNEX 4
DETAILED PROJECT DESCRIPTION OF GEF CO-FINANCED ACTIVITIES

PROMOTION OF LOW-CARBON TECHNOLOGIES
INCREMENTAL COSTS AND GLOBAL ENVIRONMENTAL BENEFITS

INTRODUCTION AND GEF PROGRAM RATIONALE[2]:

Burkina Faso is one of the poorest countries in sub-Saharan Africa in terms of GNP per capita (about $250 per year[3]), and has a limited and inadequately developed natural, physical, and human capital resource base.

It is heavily reliant on donor aid[4]. The Government has been implementing since 1991 a wide range of economic reforms under a series of stabilization and structural adjustment programs. Its 1995 Letter of Intent for Sustainable Human Development Policy laid out a vision of transforming the economy via liberalization of internal and external economic relations. By late 2000, several key policy measures – covering fiscal reforms, financial sector reforms, privatization of many public sector enterprises – were implemented; the economy has also enjoyed relatively steady economic growth in recent years (average of 5.7% p.a. from 1996 to 1999, driven primarily by strong agricultural performance).

The Poverty Reduction Strategy adopted in 2000 is based on four key aims: (i) accelerating broad-based growth; (ii) ensuring the poor's access to basic social services; (iii) expanding opportunities for employment and income generation for the poor; and, (iv) promoting good governance. The Government's action plan focuses on three priority sectors: health, education, and rural development (including investments in rural infrastructure).

The proposed project is one of the several mutually supportive Bank operations to help meet the twin goals of improving the competitiveness of the Burkinabe manufacturing sector and supporting broad-based growth and social service expansion (in particular, health, education, and water). For instance, recognizing that full implementation of sectoral strategies will require major improvements in public sector management, the Bank has employed programmatic lending in the form of Poverty Reduction Strategy Credits (PRSC I in FY 2001, PRSC II in FY 2003), which incorporate several key elements for energy sector policy reform and development of a rural electrification strategy. The access expansion portion of the proposed project also seeks to build potential synergies with Bank investment projects in other sectors – e.g., proposed Basic Education project and Competitiveness and Enterprise Development project, and recently approved Community-Based Rural Development project.

As discussed below in detail, the key rationale for GEF co-financing of interventions in the context of a broader strategic thrust for power sector reforms and electricity access expansion is to place lower-carbon technologies – and associated supply and intermediation chains – on a strong, sustained footing for competition against more conventional alternatives, thus moving the economy to a lower-carbon energy development trajectory. The project seeks to do so via a 'learning by doing' barrier

[2] The proposed project concept was developed together with a similar project concept for Mali. In many ways, the macro-economic and energy sector situations in the two countries are broadly similar. Hence key parts of the two project concepts are nearly identical.

[3] About 45% of the population lives below the absolute poverty line of around $100 per capita; the incidence of poverty – and associated concomitants such as inadequate access to infrastructure and social services – is much higher in the rural than in the urban areas. (CAS, p. 2).

[4] External aid flows are estimated to represent 13% of GDP (about the same as Government revenue), and some 90 percent of the public investment program is externally financed. (CAS, p. 24).

removal strategy – beginning with supporting a 'critical mass' of solar PV businesses and helping drive down the local investment and implementation costs. It will also support technical assistance and capacity building efforts for introducing grid-capable RETs in the energy supply mix over the longer term. The key risk is that small market size, limited absorptive and implementation capacity, and the weak status of local financial markets would limit the potential for a rapid scale-up of RET/EETs over the longer term. Careful monitoring and evaluation (M&E) is therefore critical to define an exit strategy as well as a scale-up strategy.

BROAD DEVELOPMENT GOALS

The overall project has two **development** objectives, consistent with the Burkina Faso Country Assistance Strategy (CAS) and the Poverty Reduction Strategy:

- To improve the competitiveness of the economy via rationalizing electricity supplies on the SONABEL system; and,
- To improve the quality of life and enhance the productive potential of underserved populations via expanding the peri-urban and rural access to electricity services.

The project seeks to these objectives via reforms of the legal, institutional, and regulatory structure for electricity sector, facilitating competitive private sector participation.

The **global environmental objective** of the components proposed to be co-financed by the GEF is to initiate a program of removing the barriers to adoption of renewable energy technologies (RETs) – under GEF OP 6 – as well as energy-efficiency technologies (EETs) – under GEF OP 5 – in order to reduce greenhouse gas (GHG) emissions, primarily those of carbon dioxide (CO_2).

The proposed **GEF co-financed activities** here are for *electricity-focused* EETs and RETs[5] - namely, promotion of more efficient electricity use via a demand side management (**DSM**) program, and of solar PV systems. These changes substitute for currently diesel-based electric power or kerosene use. Separately but in collaboration with the Bank, the UNDP is developing a program of support to a broader range of RETs for possible investment financing at a later date.

Cost and Financing of Promotion Program for Low-Carbon Technologies($m)					
	Total	GEF	IDA	GOBF	Private
Solar PV	$6.7	$1.4	$3.6	$0.6	$1.1
Electricity DSM Program	$5.0	$0.5	$3.5	$0.4	$0.6
Subtotal investments	**$11.7**	**$1.9**	**$7.1**	**$1.0**	**$1.7**
Technical Assistance	$1.0	$0.3	$0.7		
Capacity building	$1.0	$0.3	$0.5	$0.1	$0.1
TA/CB	$2.0	$0.6	$1.2	$0.1	$0.1
Implementation Support	$0.9	$0.4	$0.4	$0.1	
Monitoring and Evaluation	$0.8	$0.3	$0.4	$0.1	
subtotal, non-investment	**$3.7**	**$1.3**	**$2.0**	**$0.3**	**$0.1**
Total	**$15.4**	**$3.2**	**$9.1**	**$1.3**	**$1.8**

[5] The distinction here is that the GEF co-financed activities here would not address direct thermal application of renewable energy technologies or efficiency improvements in the thermal applications of fossil or biofuels (e.g., improved cooking stoves, ovens).

The proposed GEF co-financed activities have an apt fit in the present Burkina Faso power sector context and the overall project in the following manner:

- Looming capacity deficit in the Ouagadougou system – and high share of public sector demand in that system – offers an opportunity to introduce demand side management (DSM) activities, beginning with the large public sector buildings.
- The adoption of the 'minimum policy platform' for electricity access expansion, and the broader thrust of public expenditures towards decentralized administration and rural infrastructure, offers an opportunity to introduce decentralized electrification technologies and institutional models, beginning with solar PV systems.

Put another way, the key rationale for pursuing access expansion is to make sector reforms 'people-friendly', and that for the promotion of low-carbon technologies is to make both reforms and market growth 'environmentally friendly". As power sector and macro-economic reforms take hold, new regulatory institutions will have to be nurtured, and the capacity of non-SONABEL players strengthened in order to make them significant players on the new field.

The design of the overall project and of the GEF co-financed activities reflects several strategic choices that have implications for the removal of barriers to adoption of RETs/EETs. Some of these were described in the main text, but their relevance to support a shift toward a low-carbon energy path – even in a small, poor country – is described in greater detail below (in addition to some elements specific to the discussion here):

1. **Combining power sector reforms with rural electrification and promotion of lower-carbon energy paths in a single project**: This choice reflects judgment that access expansion and environmentally friendly sector development paths need to be squarely put forth as legitimate goals in the sector reform process. The alternative, of 'retrofitting' a policy framework initially geared solely to parastatal privatization with another, subsequent round of policy and institutional changes for additional objectives and goals, is neither practical nor efficient. This choice increases project complexity and implementation difficulties to some extent, and may require greater Bank/GEF supervision efforts. During additional preparation work, a balance would be sought between apparent complexity and ease of implementation. At this time, it is judged that a relatively small-scale, well-targeted investment program – about 8,400 large and small PV systems for about $6.7 million, and electricity DSM activities for large commercial customers in the Ouagadougou grid for about $5 million – with GEF investment co-financing of about $2 million is the appropriate beginning given the capacity and institutional constraints[6].

2. **Exploiting the 'policy space' of broader economic reforms and re-direction of public expenditures**: The choice of working via multiple delivery mechanisms, primarily via private sector, and selective targeting of 'cross-sectoral' initiatives (see below) in turn reflects the judgment that economic reforms that create greater private sector role in the economy (via privatization of parastatals, not just in electricity supplies but those that are significant customers of electricity) and put "hard budget constraints" on public sector agencies[7], provide an

[6] The PV systems proposed are for large institutional customers (average size 750 Wp), fixed 'household' size systems (average size 35 Wp), and small/mobile systems (average size 10 Wp). In addition to about $2 m investment co-financing, GEF support is also requested for technical assistance, capacity building, and monitoring and evaluation (M&E) activities.

[7] Which, inter alia, entail not only that the government's electricity bills of SONABEL get paid but that the responsibility is transferred to individual customer ministries and to sub-ministerial levels of administration.

opportunity to develop *commercial* approaches to access expansion and RETs/EETs promotion. In other words, it reflects a hope that the business environment of Burkina Faso over the next five years and beyond would be substantially different from that ten years ago, and that, as economic reforms take hold, broader *absorptive and implementation capacity* will develop to help create *private income generation* via expansion of electricity access.

3. **Selective 'cross-sectoral' market development**: A correlate of the preceding choice is that, within the Bank, GEF, and other donors' investment projects that are traditionally sector-focused, there is a need to work 'cross-sectorally', e.g., to selectively build and exploit synergies via coordinated investments in rural education, health, and water supply facilities. Stand-alone RETs such as solar PV systems are ideally suited to meet the needs of such institutional customers, and electricity supply to them also facilitates the use of certain information and communication technologies (ICTs)[8]. Rural electrification in general, and RET-based electricity service provision in particular, also offers opportunities for local employment in installation and maintenance. The project provides for training and capacity building for the 'cross-sectoral' partner ministries as well as SMEs. A sizeable project (about US$6 million, on soft terms from the Spanish aid agency) of "village solar PV electrification" – covering schools, health clinics, local administration posts, street lighting, and a few households – has been recently implemented in about 125 villages in Burkina Faso, and another program of PV-based water pumping has also been implemented under the European Commission's Regional Solar Program. The Bank's Community-Based Rural Development Project is also a potential source of generating and financing PV systems demand[9]. The proposed project would seek to systematically expand such 'cross-sectoral' links, and to use the 'public institutional demands' as the 'baseload' upon which greater penetration of household markets can be achieved. The key idea is to develop the demand for solar PV-based electrification AND an efficient supply response that can be scaled up in an opportunistic fashion (e.g., via bundled provision of decentralized electricity and telecom/ICT services).

4. **Building on other donors' efforts and establishing a sustainable policy and institutional framework to enable later 'scale up':** Several bilateral and multilateral donors have been engaged in assistance to the Burkinabe energy sector over the years, and recently their technical assistance has focused on power sector reforms, decentralized rural electrification, and promotion of RETs and EETs. (For instance, the PV 'village electrification' and 'water pumping' projects mentioned above.) The proposed project here seeks to build on these efforts and bring the Bank/GEF 'value added' in terms of placing the RET/EET promotion within a well-defined policy and institutional approach (whose principles are outlined in the 'minimum policy platform'). Additionally, the project will explore opportunities for institutional mechanisms for multi-donor, multi-project and/or multi-country 'market facilitation' largely outside the scope of this project and over the longer term. The idea is to bring together the learning of sub-project design, implementation, and M&E across different projects and to strengthen the 'entry points' for capacity building within Burkina Faso (across different donor projects) and in the region (including Mali and Mauritania, where similar Bank/GEF projects are being prepared). Such a 'market facilitation network' (MFN) could be an efficient and effective means to develop

[8] As with electricity, rural telecommunications access is poor. At the end of 1999, there were about 47,300 fixed-line customers, all of them in urban areas. By end-2000, there were about 5,000 mobile phone customers, again all in the urban areas. Large areas are without any communications service. Under a proposed IDA-financed TA project "Competitiveness and Enterprise Development Project", the national telephone company ONATEL is expected to be privatized, and a rural telecom strategy and funding mechanism are expected to be established.

[9] The project proposes a $55 million "Local Investment Fund" with grants-eligible projects in several areas including water supply infrastructure, social and economic infrastructure, and 'renewable energy.'

replication strategy in what are otherwise fairly small projects and country markets, with high overheads and transaction costs. It could also help develop timely indicators of 'warning signs' for projects under implementation as well as of new demands for investments and financing across different RET/EETs and customer groups.

5. **Coordination between UNDP and the World Bank**: While this is not a joint submission by the Bank and the UNDP, the two GEF Implementing Agencies have agreed on a governing philosophy of collaboration: a shared vision, with consistent signals to the GoBF and other stakeholders, but independence in execution. The Bank's primary role will be to provide investment finance and engage the GoBF in policy dialogue, and limited use of GEF resources in the capacity building activities (primarily those necessary to ensure sustainability of the Bank co-financed investments and assistance in preparing subsequent investment projects). The UNDP's primary role will be to execute a broader program of capacity building, awareness, and technical assistance activities, and support policy development as policy lacunae or inconsistencies are identified (see details in Section B, Technical Assistance – Pages 52-54)..
6. **Monitoring and Evaluation (M&E)**: The project seeks to develop a participatory M&E design that integrates M&E as a project-based 'management information system' and learning tool, and not just a data collection and reporting tool. A proper M&E system can help increase the beneficiaries' 'ownership', strengthen the hands of emerging 'champions' among the investors and financiers, and provide 'leading indicators' of problems and new opportunities[10]. GEF co-financing here will be designed to be utilized in a strategic manner so as to initiate the process of removing barriers to RET/EET adoption, with the aim of accelerating this process by the end of the project. M&E will be based on a M&E protocol that meets the GEF interest in RET/EET market development indicators as well as the GoBF, the Bank, and other donors' (including those supporting investment programs of other ministries) interest in other indicators (for instance the developmental impact of electricity access via solar PV for rural health, education, or water supplies.). The M&E protocol will be based in part on detailed subproject-level quantitative and qualitative assessments of outcomes and impacts, and may be used to provide triggers for an 'exit strategy' – if project progress is unsatisfactory – or a 'scale-up strategy' – if project progress is highly satisfactory.

7. **Phasing into alternative carbon-finance mechanisms** : If the institutional structure as envisaged in the overall project – privatized SONABEL, competitive entry in grid and off-grid electricity supplies, availability of 'smart subsidies' via a Universal Access Fund – is working satisfactorily by the end of the project, and if the delivery mechanisms for RET/EETs are judged to be effective and efficient, the next set of Bank/GEF or other donor partners' projects could incorporate alternative carbon finance sources (e.g., the Clean Development Mechanism, the Prototype Carbon Fund, and other sources, depending in part on progress in international climate policy negotiations.)

The implementation risks of proposed investments in solar PV systems and DSM are relatively small. While there are many barriers to widespread adoption of a whole range of RETs/EETs, there is already a relatively good awareness of the PV systems, and they have been accepted as a part of electricity service supply solution by the government, donor agencies, and NGOs. The key risks are that (a) implementation of power sector reforms fails to create a competitive 'level playing field' for non-

[10] Compared to recently submitted Bank/GEF projects in Uganda or Mozambique, this proposal reflects a judgment that it is not yet feasible to mount a long-term program of rural energization for productive transformation in Burkina Faso, and that the viability of private sector-based, commercial approach to rural electrification needs to be tested first. If the early results are encouraging, a wider, longer-term program of suitable scale can be developed for a future Bank/GEF operation.

SONABEL suppliers in general and suppliers of RETs/EETs and related services in particular; (b) local development impacts of RETs, in particular the improvements in service delivery at rural public institutions (health, education) or rural public infrastructure (e.g., water, telecom), are judged to be insignificant and the extent of 'ownership' is very low; (c) various donor programs provide conflicting signals to the government and the beneficiaries on the importance of commercial viability of RET/EET promotional investments; and, (d) the human and institutional capacity fails to take shape as planned for. The key assumptions are that the overall macroeconomic framework would remain stable, the GoBF poverty reduction program would proceed as planned (and agreed to in the HIPC negotiations), and that, while the overall market will remain small and fragmented for a considerable period still, there would be adequate interest in private financing of rural electrification projects as well as RE/EE equipment and service businesses, comparable to many other industries in the economy.

CURRENT STATUS

In recent years, Burkina Faso has gradually moved towards promoting off-grid access expansion, laying the ground for sector reforms conducive to access expansion in general, and via decentralized RETs in particular. (At this juncture, the potential for economically justifiable RET contribution to bulk power supplies to the main grid is unknown.) Some efforts have been made through donor support to electrify villages using alternative means such as mini-grids and solar electric (photovoltaic) technologies. For example, the European Union assisted SONABEL in establishing diesel-based mini-grids for three larger rural villages (Nouna, Kongoussi, and Diebougo). At Kongoussi, 120 km north of Ouagadougou, a network was established in 1998 with initially 400 customers connected. Today the number of connections has grown to almost 900, most of these being households. Denmark (DANIDA) has also supported three grid-related pilot projects that started in 2001; two have mini-grids with diesel power generators, while the third will involve private operation of a local distribution network with bulk supply from the SONABEL main grid. A program of decentralized electrification has been drafted, and

Burkina also has benefited from some donor-supported programs in solar photovoltaics. Spain, the Netherlands, France, the AfDB, UNDP, UNESCO, and the Activities Implemented Jointly (AIJ) are all providing support in this area. For example, a recently implemented Spanish program supports electrification of rural institutions by solar PV systems. Typically this program delivers stand-alone PV systems to clinics, schools, and for street lighting in village centers. It has covered 120 villages so far, and additional 85 villages may be considered in a subsequent phase. The Spanish and US PV system suppliers are working to develop an infrastructure to support ongoing maintenance, repair, and replacement of equipment. Discussions have been started at the village level on how to recuperate running, expansion, and maintenance costs. The French-supported PV program also would provide village level solar, but would incorporate a more commercial focus. The Dutch program has supplied PV systems for water pumping stations in rural areas.

Burkina has hosted several donor-supported programs in biofuels. These have been focused mainly on applied research on conversion of agro-residues into heat and electricity for small-scale uses, both domestic and industrial (biogas and gasifiers). This work was conducted under the guidance and collaboration of the two Ministries in charge respectively of Energy and of Higher Education and Research. However, several barriers have hampered commercial application of these technologies. These include the high initial costs of the equipment, institutional and legal barriers, and lack of information for the private sector. The 1995 Review of Policies of the Traditional Energy Sector (RPTES) funded by the Dutch Government and conducted by the Bank indicated the high potential of biomass from agro-

industries, particularly sugar cane, cotton, and rice. An important indicator of this potential is their availability within a relatively concentrated geographical area where the conversion can take place for various usages.

BARRIERS TO RE/EE MARKET DEVELOPMENTS AND BARRIER REMOVAL STRATEGY

As in several other sub-Saharan African countries, the barriers to RE/EE investments in Burkina Faso are often the same as the barriers to access expansion – principally, (a) limited awareness of benefits and information about supply chains; (ii) lack of policy and regulatory framework conducive to competition (to the utility monopolies[11]); (iii) limited market size and concomitant high transaction costs of initial investments, especially if private sector-led; (iv) lack of financing and risk mitigation mechanisms, and difficulties in validating workable business models; and, (iv) limited institutional and human resource capacity, often diverted to heavily grant-driven projects of external donors, resulting in low local ownership and commitment to global environmental benefits.

In the context of project such as the one proposed here (similar to that in other recent Bank/GEF projects in sub-Saharan Africa – e.g., Uganda and Mozambique), the focus of GEF assistance is in removing the barriers *specific* to RE/EEs, the thrust of main power sector reforms being that on removing the barriers to access expansion in general. The strategic choices noted above address the main element of the strategy to removing these barriers – i.e., combining sector reforms and investments in interconnections on the main grid with a comprehensive rural electrification strategy and promotion of lower-carbon energy paths addresses the policy and institutional barriers.

Yet the policy and institutional reforms by themselves would not be sufficient. A package of investments, technical assistance, and capacity building specific to RET/EETs would be necessary. This would be done in an opportunistic manner – finding the 'workable entry points' for a sustainable intervention, and providing the incentives for expanding the market. Because, at its core, the problem of promoting widespread adoption of RET/EETs is *limited market size, and limited competition.* This is essentially what lies behind many of the other 'barriers' usually cited – limited market size and limited competition lead to unnecessarily higher economic costs for technologies that are already capital-intensive[12]; these in turn lead to unnecessarily higher financing or grant requirements.

Small, largely 'grant driven' projects are both the cause and the symptom of this core problem. All interventions to date to introduce solar PV systems (and to a much lesser extent other RETs) have been 'supply driven', with heavy grant component for both the equipment and skills. In turn, the grants have largely gone to finance imported equipment and skills. This has made RET promotion a 'grant-dependent' enterprise, with limited scope for long-term sustainability. Heavy grant dependence is not in itself or necessarily a cause of non-sustainability; given the affordability constraints that would last for a

[11] That is, monopoly in generation and distribution to a utility with a *de jure* nationwide franchise, combined with uniform national tariffs, is a barrier to access expansion in general. When only generation is de-monopolized, economically justifiable RETs face certain barriers in supplying bulk power to the grid (which may or may not be necessary for access expansion) because of their risk and financing profiles. When generation as well as distribution are de-monopolized and uniform national tariff abolished, barriers to access expansion per se are lowered, and the barriers the economically justifiable decentralized RETs face are (largely) those specific to the cost and financing profiles of RETs themselves (vis-à-vis fossil-based alternatives).

[12] Although the capital costs of off-grid RETs are sometimes far higher than those of competing technologies, the main economic rationale is that their lifetime costs could be lower (compared to kerosene lamps or battery charging with gensets or grid supplies), and that the lighting service they provide is of far superior quality (compared to kerosene lamps). With EETs, capital cost comparisons are different depending on whether the existing equipment needs to be replaced or whether the choice is between new equipment of different efficiency ratings.

generation or more, and given the weak intermediation mechanisms for debt finance, some of the RETs will retain grant dependency for quite some time.

Limited market size and grant dependence tend to aggravate the other barriers – there is no incentive to acquire information and awareness, or otherwise invest in capacity building; there is no incentive to search for lower costs or to take risks in expanding market share via offering lower prices; the 'economic' market remains small, and the 'financing' requirements continue to be high and difficult to channel via conventional commercial banking mechanisms. Relatively small local ownership or championship is established, and the perception that 'low carbon technologies' are largely favorites of external donors continues.

Prices remain high because costs remain high AND because of the willingness of external donors to absorb the high costs (including those in implementation). The issue, therefore, is whether both the capital and operating costs can be reduced at various stages of the supply chains (including the costs of equipment as well as skilled manpower), whether the import dependency (for equipment or skills) can be reduced at least somewhat, and whether the local developmental impacts can be shown to accrue to a larger group of beneficiaries (than, say, only the recipients of a largely 'free' solar PV system). If so, grants can be progressively targeted at poorer segments of the market, unit grant needs (per kW of service delivery or per capita beneficiary) can be lowered significantly, and there would be a greater local ownership of new technologies and implementation models.

THE BASELINE

Without GEF participation, (a) the focus on RET/EET promotion would be diffuse, and not linked to a broader vision of a cleaner energy future; (b) RET/EET investments will not reach a 'critical mass' to mobilize local private sector capacity for competitive supplies; and (c) the justification to invest human and institutional resources into technical assistance and capacity building will be much weaker.

That is, the core problem of RETs/EETs – limited market size with limited or no competition, resulting in unnecessarily high capital and service costs, and low domestic capacity, in turn requiring high external support – would persist. Even if the market grows because of external financing, it would remain inherently non-sustainable, with at best a marginal reduction in supply and implementation costs, in response to competition in the international markets. There would be limited local 'ownership' or 'championship' of a commercially viable RET/EET program.

A. Increased reliance on petroleum-based fuels – with associated carbon emissions – for small electricity markets:

   - Rural public facilities (health clinics, schools) will continue to rely on gasoline generators for the provision of electricity, and there will be no 'demonstration effects' on private customers – 'larger' commercial customers or individual households;
   - Peri-urban and rural households that cannot be effectively served by the main grid or independent grid supplies will continue to rely mostly on kerosene lighting (with some use of automobile batteries or dry cells for small electrical appliances such as radios or flashlights).

   The solar PV market would continue to expand, but largely via small ad hoc donor programs with heavy grant component, procurement tied to the donor country(ies) sources, and limited local content in assembly. The overall market size would remain small, supply chains would be weak, the differential between world and local equipment prices would remain high, and the local service costs would also remain high.

B. Increased reliance on petroleum-based fuels for main grid or backup generation

- Large 'commercial' tariff customers – on LV or MV lines – in the Ouagadougou system would continue to use electricity inefficiently and pay high electricity bills. Such wastage would exacerbate the current generation deficit and/or lead to higher-cost private backup generation (also petroleum-based).
- There will be no incentive to develop the supply chains for higher-efficiency lighting systems and small appliance. This could have a deleterious effect on the poorer customers as they acquire grid electricity access because, if they are to pay cost-reflective tariffs (especially in the isolated grids), low-wattage higher efficiency items are relatively more beneficial to them than the better-off customers.

In other words, the market for air-conditioning and lighting systems will remain biased towards lower-efficiency, lower capital cost, products.

C. Limited capacity development in private and public sectors:

- Domestic solar PV industry will remain small, serving an unpredictable and geographically spotty market, and its incentives to establish reliable supply chains externally or internally, or invest in human resource capacity, will be sharply lower;
- There will be virtually no capacity in the public sector to help identify, design, and implement RE projects. In turn, the scale and experience base of technology adaptation and 'localization' will remain very low, and the pace of RE development will remain largely subject to small, uncoordinated projects of individual external grant donors.
- The potential benefits of 'sector reforms' – demonopolization of the grid electricity supply industry, establishment of third party access and unbundled tariffs, and transparent 'smart subsidy' mechanism – will not accrue to the EE/RE industry (or will be sharply limited, and go to support unnecessarily higher costs).
- The volume of overall cost-effective investments over the longer term will be lower. This is because, to the extent that RE technologies provide an opportunity to serve small, disperse markets more cost-effectively over the long term, continued reliance on higher-cost options such as main grid extension or kerosene would necessarily imply an economic loss. Also, to the extent that continued reliance on low-quality lighting sources such as kerosene lamps involve higher costs (in the long term), there is a corresponding loss in economic welfare, and the transition to modern lighting services would proceed slower.
- Donor assistance will remain fragmented and less effective.

THE ALTERNATIVE (THE PROJECT)

Under the project alternative, the market for RETs – particularly, solar PVs – and EETs – particularly, in the large LV customers – would be expanded in a competitive manner so as to lower the costs – at least, substantially reduce the current cost differentials between the international and local prices for the imported equipment, and lower the domestic costs of after-sales service. With associated efforts in capacity building in both the public and private sectors, the key approach is that of 'learning by doing', with the intent that the learning acquired and assimilated during the project offers an opportunity for a subsequent rapid scale-up. That is, *at this stage the key barriers sought to be lowered are high costs and low domestic absorptive and implementation capacity (including the capacity to develop additional projects for future financing.)* As the sector reforms and new institutional framework take hold, and as the

Government's Poverty Reduction Program gains momentum, it may be possible in a few years to mount a more ambitious program of lowering the supplier and end-user financing barriers

A . Investments in Institutional/Household Solar PV Systems:

There are two potential markets for solar PV systems in Burkina Faso: (a) **households in the peri-urban areas** of cities and towns; this market is likely to be cash-based and requiring small amounts of subsidies for PV systems; and, (b) **households as well commercial/institutional customers in the rural areas;** the non-household part of this market is likely to be mostly grant-driven, with grant financing coming largely from donor projects in other sectors (rural development, education, and health). The latter (institutional) market also offers opportunities to combine ICT "connectivity" with the provision of solar electricity in rural areas, and to offer "an electrons package" (i.e., solar electricity and ICTs powered by it) to institutional customers that may be partly financed under the proposed Community-Based Rural Development Project (Project 035673) and/or via the proposed Telecommunications Fund (in a separate Bank project)

The project will seek to open up the external donor grant-financed commercial/ institutional market for solar PV systems to local competitive procurement, and to establish the financial, technical, and business development intermediation mechanisms for local suppliers. Once such suppliers are established and can provide reliable sales and services to a largely grant-financed market, it is expected that the information, marketing, and financing barriers to solar PV systems will be substantially lowered and the resultant increase in market size (combined with the continued price reductions for solar PV in the international market) will diminish the need for grant-financing of solar PV investments. Also, if commercial banks show interest, an on-lending window to re-finance consumer credit extended by private solar PV dealers may be considered during the course of project preparation. (The appropriate role of specific delivery mode or financing, or a mix of several such modes, will be determined during the course of project preparation.)

The commercial/institutional market (of 400-800 Wp size each) – on cash basis to PV suppliers - for PV systems will provide the room to 'piggy-back' the household PV markets (for solar home systems of 30-50 Wp capacity and small/mobile solar systems of 10-15 Wp capacity). Further market assessment is required to determine an appropriate model of ownership and finance.

Under the GEF **alternative**, therefore, the average annual PV market be expanded to roughly $1.5 million (average of 135 kWp) per year. PV businesses would be assisted in finding best-price sourcing opportunities from around the world (including possibly local production of some components), and would be provided a per Wp subsidy to reduce first costs and enable expansion of sales and service networks. The businesses will also be given other direct assistance, as necessary, in strengthening their capacity to access commercial and quasi-commercial short- or long-term finance (including from other project windows – e.g., for SME development projects – or from foreign equipment suppliers and private grant donors).

This package of interventions to rapidly expand the market in a predictable manner and supporting the entire delivery chain as well as pioneering institutional customers is expected to lead to significant cost and price reductions (via international competitive bidding) as well as greater awareness and acceptance – first for the larger institutional systems and gradually for the smaller systems.[13] Taken together, GEF funds finance both the equipment subsidy (an average of about $1.9/Wp; see below) and the costs of implementation and monitoring and evaluation. That is, while the calculated incremental costs

[13] A larger and growing market also helps reduce the costs of training for service and maintenance.

for solar PV investments turn out to be about $2.7/Wp, only a part of this would go for direct equipment subsidies.

PV Investments				Calculated Incremental Costs		
	Avg.size Wp	**# of systems**	**Capital cost $/Wp, avg.**	**per Wp**	**per ton CO2**	**per ton C**
Institutional systems	800	400	$12.6	$2.6	$22.3	$82
Home systems	35	5,000	$12.6	$2.8	$12.8	$47
"Small"/mobile systems	15	3,000	$10.0	$2.6	$12.5	$46
Total/weighted average	540kWp	8,400	$12.4	$2.7	$16.9	$62

Note: Incremental costs are differences in the net present values. Capital costs and incremental costs are averages over project duration. There is no 1:1 relationship between incremental cost in $/Wp and in $/t CO_2 across because of different baselines for different PV systems types/sizes.

Since the awareness of PV technologies is fairly significant by comparison to other sub-Saharan African countries, and some investments in supply chains have already been made, the key barrier sought to be lowered by these investments is the high cost differential between the domestic and international equipment costs, and the weak local capacity for installation and after-sales service.

Use of GEF Funds

Grant financing:

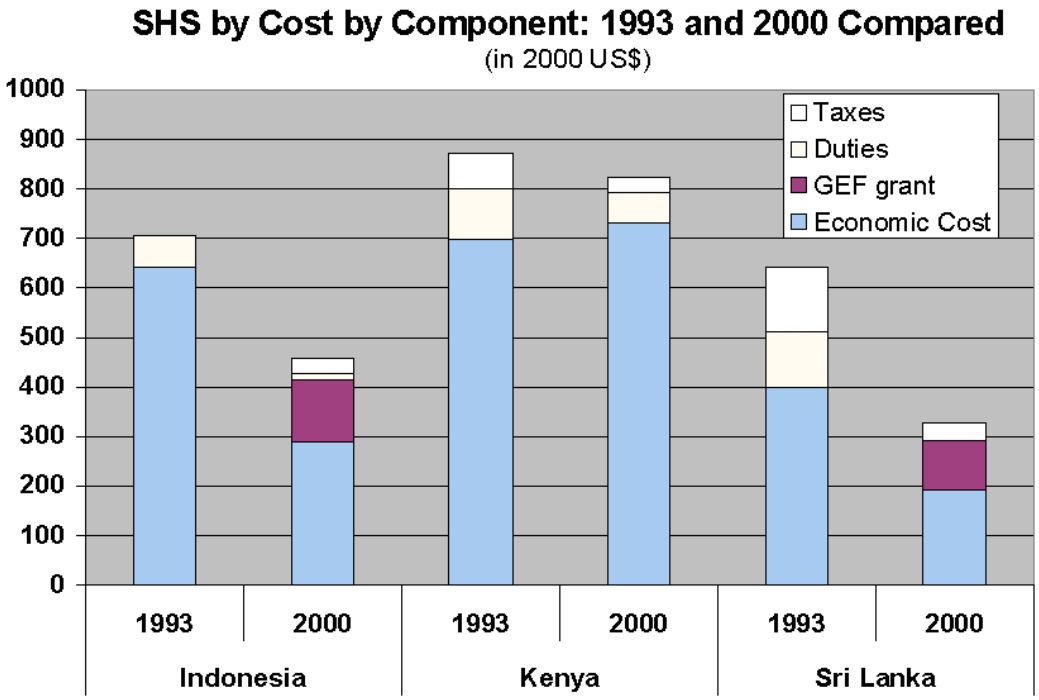
GEF funds will be kept administratively separate from other funds. All GEF funds will be used on a grant basis to eventual implementing entities – not directly to the owners of the RET/EET equipment. The grant funds are in principle directed at the change agents who actually help remove the specific barriers and not the beneficiaries of barrier removal, so the 'subsidy' element is more a 'reward for barrier removal and risk-taking' and does not cause a direct, long-term reliance on GEF grants per se to meet the affordability constraints for electricity access (which, as discussed above, are to be distinguished from barriers to the adoption of RETs for such access)

Accordingly, the project will offer output-based ($/Wp, or FCFA/Wp) incentive payments to private solar PV dealers according to a tentative schedule described below. These payments are aimed at supporting additional investments by the PV dealers and will be disbursed after confirmation of installation under certification rules that will be developed during the course of project preparation. As can be seen, the incentive payments for the small systems would be proportionately higher than for the large institutional systems, because while the institutional systems will be purchased by the relevant GoBF ministries from their respective investment plans, the fixed Solar Home Systems (SHS) and the small systems will be purchased primarily on cash basis. Because the experience to date with SHS has been limited – most of the donor projects have financed large systems – and small/mobile systems are new to the market, a higher incentive payment would cause the dealers to compete more aggressively to market these systems.

Also as shown, the unit incentive payments will decline over time, except for the smaller PV systems. In all, about $1 million – out of the proposed request of GEF grant of $1.4 million to support PV investments – will be disbursed as incentive payments. The remaining $0.4 million will also be used for incentive payments, depending on whether the qualifying market is larger than assumed here or whether the structure and rules of incentive payments need to be modified during the course of project implementation.

Output-based GEF Co-financing for PV Investments						
		Years 1 & 2		Years 3 & 4		
Type		$/Wp		$/Wp	Avg. $/Wp	
Institutional PV systems (~800 Wp)	$	2.0	$	1.5	$	1.8
Home systems (30-50 Wp)	$	2.5	$	2.0	$	2.2
Small systems (10-20 Wp)	$	2.5	$	2.5	$	2.5
Total	$	2.1	$	2.0	$	1.9
Indicative budget ($m)						
Institutional PV systems	$	0.32	$	0.24	$	0.56
Home systems	$	0.13	$	0.25	$	0.38
Small systems	$	0.03	$	0.09	$	0.12
Total	$	0.48	$	0.58	$	1.06

In other Bank/GEF projects, it has been observed that the proposed approach of providing GEF grants as a limited 'incentive payment' to the dealers – rather than a subsidy to the final end-user – results in a significant price reduction.



Precise 'cut-off' points between the 'medium-size' SHS (30-50 Wp) and 'small' systems (10-20 Wp) cannot be determined at this time, and may be left open even at the time of appraisal. This is because the familiarity with the SHS is quite limited, and it is impossible to tell in advance how the market composition would change over time. Changing subsidy levels or size specifications mid-project can involve administrative problems, but sufficient flexibility needs to be built in at the outset so as to give consistent support signals and avoid 'gaming' on the part of the vendors. Further preparation work and local consultations with beneficiary groups is expected to assist in resolving this issue.

B. Investments in Electricity Demand Side Management (DSM):

Here "DSM" includes both changes in the capital equipment, primarily in the air-conditioning load, and the use and maintenance behavior, of commercial customers of the Ouaga grid (CRCO). In 1999, these customers accounted for about 25% of the total kWh sales of SONABEL; in turn, 40% of the commercial sales are to the public sector. Most of these sales are to a small number of large MV (medium-voltage) customers - 43 MV customers with > 200 MWh annual billing accounted for nearly half of the total commercial sales (about 22.6 GWh out of 46 GWh) - and, in the case of public sector, essentially only one customer - the Ministry of Finance. This is because all public sector buildings' bills are presented to the Ministry of Finance, which is responsible for scrutiny of the bills and payment. (Sometimes, only individual buildings are metered, so that if one building is shared by different ministries, there is no separate bill for individual ministry.) Put another way, the GoBF is not only the largest customer of SONABEL, it also stands to gain the most by adopting a DSM program, both directly - via reducing its own bills - and indirectly - via averting a significant share of SONABEL new capacity investments in the near-term and, over the longer term, ensuring better capacity utilization of the new transmission investments for imported electricity.

The main barrier to reducing the wastage in electricity use among the large public and commercial sector customers have been (a) the lack of incentives for SONABEL, (b) the lack of commitment by the policymakers, (c) unavailability of finance, and (d) technical assistance in creating

proper institutional framework and the supply chains for both EETs and associated awareness and training programs. Sector reforms proposed under this project seek to modify the structure of tariffs and other incentives for SONABEL, and provide finance as well as technical assistance. The Danida financed DSM study for the Ouagadougou system has already convinced the policymakers of the benefits of a DSM program for the large public sector customers.

Under a DANIDA technical assistance project, an Emergency Progam for the CRCO public sector customers is being prepared; final results of the study are expected to be available by May, 2002. Preliminary results based on a selected audit of public sector buildings indicate that a package of investments - in new air-conditioners, air leak prevention, use of shades and reflective windows, and in a program of maintenance and repair combined with an awareness campaign for behavioral changes - in selectively targeted buildings would substantially reduce electricity bills. That is, targeting only about a third of the current public sector consumption in CRCO, an investment of about $1million could reduce annual electricity bills by about $0.45 million. The payback period at the current average cost of about 85 FCFA/kWh is 3.5 years. When improvements in lighting systems are considered, the investment requirements are relatively smaller (about $315,000) but the payback period is even more attractive, at only 1.6 years.

Based on these preliminary results, the DANIDA study has prepared a tentative investment plan covering a larger set of public sector buildings and including investments in both air-conditioning and lighting systems (including those for replacement of existing equipment, and changes in procurement for additional equipment) and in related measures. As outlined below, the proposed plan aims for about $3.6 million of investments with a simple pay-back period of about 3 years. The 'incremental costs' for such investments are negative within a range of plausible discount rate. However, a small amount of GEF support is warranted in the process of initiating awareness building, policy development, and capacity building for the local equipment supply and maintenance businesses. The calculations presented below are robust with respect to anticipated tarifff reductions from interconnection of the Ouaga-Bobo systems or Ouaga interconnection for power imports from Ghana; while the simple pay-back period increases, the program is still economical with an average MV tariff reduction of up to 50% using a real discount rate of 10% p.a.

DSM Program in Public Sector Buildings in Ouagadougou		
FCFA/$		700
Total electricity consumption in buildings	GWh/yr	30
Average cost of electricity	FCFA/kWh	100
Total electricity bill to the State	$m/yr	$ 4.3
Potential savings in air-conditioning	GWh/yr	10
Potential savings in lighting	GWh/yr	2
Reduction of electricity bill	$m/yr	$ 1.6
Additional running costs (maintenance, energy management)	$m/yr	$ 0.5
Annual savings for the State	$m/yr	$ 1.1
Investment cost	$m	$ 3.2
Technical assistance	$m	$ 0.4
Total implementation cost	$m	$ 3.6
Simply play-back period	years	3.2
Source: Unpublished draft study for the GoBF.		

In addition to the DSM program for public sector buildings described in the table above, the project will also finance similar investments in the large commercial customers of Ougadougou system. As in the case of PV systems, it is expected that as the large 'buildings' customers – and the construction companies – adopt higher-efficiency air-conditioning and lighting systems, the electrical equipment market for smaller users would also shift towards lower costs for higher-efficiency products. The key barriers sought to be lowered are (a) inappropriate incentives – embedded in tariff structures and public sector utility management – to SONABEL and the large customers; (b) lack of 'proof' of the economic benefits of DSM programs; (c) lack of attention to energy efficiency in building codes and standards; and, (d) procurement practices of public sector agencies.

Technical Assistance and Capacity Building

The project will also finance selective technical assistance and capacity building activities, some to be implemented under the Bank-financed project and some under a separate UNDP project to be co-financed by GEF and other donors. These activities are designed to be mutually supportive, but their execution will be independent of each other. Activities under the Bank/GEF umbrella are to focus on the strategy and policy development and capacity-building at the central level, whereas those under the UNDP/GEF umbrella are to strengthen communities, enterprises and non-governmental organizations active in grassroots level rural development.

- Resource assessment for grid-capable RETs for bulk supplies for distribution

  This activity will be further defined during project preparation. Available information indicates that the wind, micro-hydro, and bioenergy potentials are limited, and the supply chains much weaker than those for the solar PV systems.

- Assistance in 'cross-sectoral' market development and in promoting income-generating applications of decentralized RETs

  To implement the institutional solar PV systems will require cross-sectoral collaboration among different ministries, accompanying experts and businesses. To facilitate this process an inter-ministerial working groups may be established. The group will support the government officers in establishing functional specifications, technology assessment tools, operation and maintenance schedules, fee collection mechanisms, definition of responsibilities, procurement guidelines etc.

- Supply chains strengthening and business support

  This activity will support the businesses in their market research, controlled test marketing[14], and outreach. The focus of the market research and the controlled test marketing is towards the more affordable smaller solar systems for households and optimal design for the larger scale institutional systems. The market research will clarify the profile of the potential buyers therewith establishing stronger focused marketing strategies, product design and pricing policies. This activity will be developed and undertaken in close collaboration with the existing companies, and build on the experiences of some of the larger commercial companies who use similar market development process. In the later stage of the project, specific marketing tactics like road shows, district demonstration centers and national awareness campaigns might be considered.

[14] Controlled test marketing is a defined activity in the marketing area, it can provide test results that reliably simulate real-market conditions and buyers. These methods can reduce risk and test-market costs as well as save time.

Local renewable energy businesses will receive support to prepare better business plans and implement them. Initially, SME development experts with the assistance of a PV market expert will develop criteria for a high quality business plan in the Burkinabe context. Individual businesses will then be provided guidance and, as necessary, training, to prepare and execute such business plans, including – if necessary – by establishing twinning relations with high quality foreign businesses (i.e., promising south-south trade relationships).

- Training programs:

  Training needs for both the DSM and PV components will be defined during project preparation. Particular attention will be given to a training module on the cross sectoral renewable energy options in the health and education sector, and build on lessons learned by the WHO[15], NREL and other international organizations that have worked with and tested the different options in other developing countries.

In parallel, UNDP is developing a GEF co-financed program of technical assistance and capacity building that could consist of the following initiatives:

a) Market assessment for stand-alone biomass-based power generation and cogeneration:

   The 1995 Review of Policies of the Traditional Energy Sector (RPTES) funded by the Dutch Government and conducted by the World Bank indicated *the high potential of biomass from agro-industries, particularly sugar cane, cotton, and rice.* An important indicator of this potential is their availability within a relatively concentrated geographical area, where multiple energy needs can be serviced. The proposed activity would focus on market characterization, project identification, stakeholder consultations, and assistance in project development. The potential for aggregating bioenergy markets in the West African region beyond Burkina will also be assessed.

b) Pilot program in rural energy infrastructure extension services

   This activity will establish a pilot initiative in renewable, rural energy infrastructure extension services to provide technical assistance and market promotion for PV systems and other renewable energy systems as appropriate. It will provide assistance to communities, farmers, entrepreneurs, renewable energy equipment suppliers, government agencies, NGOs and others to identify and facilitate establishment and expansion of rural enterprise opportunities combining renewable energy technologies with economically productive activities.

c) Support to combat theft and trafficking in stolen PV modules and related equipment

   This activity will support a West Africa regional workshop (and related follow-up activities) on the subject of theft and trafficking in stolen PV modules and related equipment. The workshop, aimed at identifying policy initiatives and effective law enforcement, will be designed and convened in cooperation with leaders of the PV industry, the European Union, with UNDP and World Bank projects elsewhere in the region, including Senegal and Burkina Faso, and other stakeholders. The proceedings will be made available in French and English and distributed worldwide via CD-ROM and the Internet, as well as in print form.

[15] The WHO recently finalized a four-year research project to determine an integrated approach of solar energy for primary health care.

d) Training to lending institutions such as Caisse Populaire on financing RET investments

The *Caisse Populaire* is a national rural credit institution with representation throughout Burkina Faso. It is engaged in a new AFD-sponsored project for distribution and end-user financing (3-year credit) for PV kits for rural households. UNDP/GEF could build on this experience and help the CP expand its lending activities for households, community organizations, rural enterprises, and others. A technical assistance component could be built up within some of the larger CP branches, to assist potential borrowers in assessing the technical and financial aspects of PV equipment.

The key linkage between the TA/capacity-building activities of the Bank/GEF and UNDP/GEF is as follows: the UNDP/GEF activities aim to (i) expand the scope of the rural and renewable energy program to other technologies, via technical and institutional pilots; (ii) help promote the productive and private income generating activities with the use of renewable energy technologies; and (iii) help meet the demands for human resource capacity generated by the Bank/GEF activities. Put another way, the Bank project via macro institutional changes and support for renewables-based electricity access expansion options is expected to create grass-roots level need for capacity, and the UNDP/GEF activities are expected to be so tailored as to meet the diverse capacity needs that will become clearer only during the course of actual implementation of the Bank/GEF sub-component.

Possibilities for Non-grant Financing

Due primarily to the severe structural and capacity limitations of the commercial financial institutions in Burkina Faso, the GEF grant will be provided directly as a subsidy to the sellers of PV systems under rules of competitive procurement to be defined during project preparation. However, since the potential market for PV systems may expand beyond the scope of this particular project (i.e., due to other donor-financed projects or spontaneously) – it is possible that these sellers' short and long-term financing requirements increase – e.g., for establishment of ESCOs – direct subsidies to investments will be eliminated and replaced by other modalities such as partial guarantees and contingent financing.

GLOBAL ENVIRONMENTAL BENEFITS

The direct calculated avoided CO_2 emissions due to solar PV investments are in the order of about 85,000 tons (or about 23,200 tons of carbon). The $/Wp and $/tC incremental cost estimates presented above are strictly on the basis of investments proposed under this project; i.e., secondary impacts via expansion of market for other investments during the course of this project or beyond have not been taken into account.

Avoided CO_2 emissions from the DSM program have not been estimated because the calculated incremental costs are negative for the investments proposed under the project. The likely 'spin-off' effects of adopting higher-efficiency standards and greater availability of EETs for markets not directly addressed by the project – e.g., CFLs and higher-efficiency appliances for the household and small commercial users – are not taken into account, in part because, at the margin, some of the avoidance of CO_2.emissions would occur in other countries (Cote d'Ivoire or Ghana) and it is as yet impossible to quantify the source of 'negawatthours' at generation level.

SUSTAINABILITY

A key strategic reason to choose to initiate EE/RE investments in the context of sector reforms and SONABEL privatization is to seek to ensure sufficient, gradual nurturing of the local markets and

capacities so as to ensure the long-term sustainability of RE investments under the project AND acceleration of these investments beyond the period when GEF grants cease. The overall approach is that, over time, sustainability will come from barrier removal, cost reductions, rising incomes, and declining GEF grants. Also, as the Government plans to finance the electrification fund via, for example, a levy on grid-based electricity, the need for external grants to support electrification in general, or that via RE technologies in particular, will decline.

For solar pv systems, the decline in costs will come from: (i) economies of scale –which are often realized when a credible expectation of a large market has been created, (ii) formation of links to lower-cost suppliers abroad, and (iii) rising incomes, which will increase the affordability of the systems. Further, the GEF grant per unit for solar pv systems is also slated to decline over time.

Thus, the key assumptions underlying the viability and replication prospects are that cost-reductions will be realized and incomes will rise. Given the GEF share of 20-25% in total costs, it is reasonable to expect that cost reductions and income increases over a number of years will offset the need for such support after the project is over. Additionally, the planned TA/CB activities will support 'learning by doing' and incorporating mid-term revisions and corrections along the way; taking care to reduce grant dependencies of individual sub-projects.

As one of the least-developed countries, Burkina Faso is expected to remain dependent on grant support from donors in social sector investments – e.g., health and education. To that extent, the expansion of the 'public institutional market' will remain indirectly dependent on donor support. The major change this project proposes in this regard is to incorporate 'electricity (and perhaps ICT) provision' as a routine part of budgetary processes of individual line ministries. Initially the PV sellers take the usual commercial risk that this portion of their market depends on the ability of the GoBF to fund public-sector social services. Over time, as their market grows and diversifies, this risk would become relatively smaller.

A key lesson from the EU-financed Regional Solar Program for community-level PV systems (largely for water pumping) is that the communities must be prepared to pay for the repair and maintenance of PV systems, and the quality of such services in turn must satisfy their requirements. (In Burkina Faso as of 1999, about 75% of the villages with maintenance contracts were expected to be current or nearly current with their payments.) Remuneration of the maintenance contracts is also a significant part of the revenues of local PV companies, and it allows them a platform for engaging in new commercial activities and product lines (e.g., battery charging).

Some of the initial as well as replacement capital cost may come from the governmental sources – either directly to the institutional users (clinics, schools) themselves or via the funds for local governments. In turn, the beneficiaries should also value the improvement in service quality – e.g., water availability, or lighting in schools and clinics – enough to either contribute to the repair and maintenance costs or higher fees for services (school or clinic visits). The project's emphasis on reducing the initial costs and building capacity (and incentives) for quality after-sales service seeks to ensure that the systems financed under the project are sustained long after the project has closed. To the extent that both the initial capital costs come down - in line with expected cost reductions in the international markets - and that after-sales service requirement needs are properly met, the 'replacement' costs for the investments under the project will be lower.

Beyond the lifetime of the project, experienced and capable vendors would also be able to engage in some supplier credit to the new end-users, and other credit mechanisms also become more viable (e.g., microfinance to household or small commercial endusers). If the businesses have proven the effectiveness of PV technology and their sales and service capabilities, additional public institutional customers (in the

health and education sectors, but potentially expanding to other such sectors) will be interested in purchasing PV systems, and the demonstration effect would also encourage other large, private users (private schools and health clinics, for instance) to do the same. Similarly, grid concessionaires could also be interested in incorporating PV systems as a part of their supply plan, either for retail or short-term credit sales or on a fee-for-service basis.

At the same time, it has to be recognized that subsidies for PV systems address both the affordability barrier as well as the other barriers. A project such as this in a context such that of Burkina Faso can only address the latter barriers, not the affordability barrier. This means that for a sustained expansion of the PV market - as for any other rural electrification technologies and models - will eventually require subsidies *to the progressively lower-income households and communities*. (Under the proposed project, the subsidies are to be given to PV vendors, effectively assuring them of a competitive reward in exchange for meeting certain performance criteria.) These subsidies will then be provided via the general Universal Access Fund. The Government via its adoption of the 'minimum policy platform' has committed itself to establishing a Universal Access Fund as well as to help create a 'level playing field'. If the experience under the proposed project is positive – indicating that PV businesses can provide reliable service, and can scale up to meet a growing demand without direct support from the Government – the next step will be to switch both the subsidy mechanism (making it a part of the Universal Access Fund) and the form of delivery – e.g., concessional credit via suitable intermediaries. Inasmuch as the central and local governments themselves are likely to continue to be significant customer of PV systems, successful outcomes and impacts under the proposed project would create conditions for the local PV industry to stake a credible, legitimate claim to subsidy resources based on quality performance and fully integrate PV as a part of the electricity access program in the future.

REPLICABILITY/EXIT STRATEGY

It is as yet difficult to fully assess the implementation risks to define an appropriate 'exit strategy or develop 'leading indicators' of project troubles. Similarly, it is as yet difficult to develop 'leading indicators' of project successes conducive to the preparation of a 'follow-on' project. It does appear that not all barriers to a large-scale adoption of EETs/RETs in the Burkina context can be adequately removed during the course of a single project, and the monitoring and evaluation systems to be designed must be 'forward looking' and facilitate ongoing learning and information dissemination to the project implementing unit. This would be further refined during the course of project preparation. The exist strategy that will be firmed up in consultation with the Government and other key stakeholders are that by mid-term review: (i) a minimum 25% of both the Bank credit funds (for institutional customers) and the GEF grant funds have to be disbursed in the first two years of the project, otherwise the PV component will be re-designed or its scope significantly reduced; and, (ii) the GoBF and other donors must be adequately supportive of the commercial approaches to rural electrification in general, and PV promotion in particular, and provide adequate support to building local capability in efficient sourcing, after-sales service capability, technical and commercial certification, program administration, and M&E.

MONITORING AND EVALUATION, AND DISSEMINATION

Monitoring and evaluation toward the GEF objectives will be part of the overall project monitoring and evaluation (M&E), which will focus on three broad categories of impacts – direct and indirect benefits of electricity access; market viability of a variety of suppliers and technologies; and, achievement of environmental objectives. GEF-specific indicators will be linked to the second and third of these categories, and are briefly described in the table below. Baseline levels at the beneficiary level will be established during further project preparation and initial implementation, using both quantitative survey techniques as well as participative techniques for qualitative data. It is agreed that some of the M&E should be increasingly 'mainstreamed' and 'localized' – so that the beneficiaries and market

players themselves have an interest in providing, collecting, and reporting data. Dissemination of program results will be accomplished through regular reporting to local and donor stakeholders.

Two additional considerations arise in the design of M&E:

- Pre-existing or complementary investments: to the extent that some of the project investments – in particular, the solar PV investments – and related local capacity building may occur in the same geographic areas of the country as where some similar complementary investments may already have been made or may be made during the course of this project (e.g., those funded by other donor projects), M&E activities for the proposed project may capture some of the positive or negative impacts of those other investments[16].

- Multi-project information-sharing and market facilitation activities: Several other countries in the region have significant renewable energy projects – completed, under implementation, as well as new (including the EU-sponsored Programme Regional Solaire phase I and II, and anticipated Bank/GEF 'climate change' projects in Mali and Mauritania). Many of these projects share, and are expected to share, common features in market and capacity development for a number of RETs. A multi-project and multi-country institutional mechanism that adopts a somewhat 'standardized' approach to capacity building and M&E may be useful in several respects – common approach to procurement of goods and services, adoption of a standard M&E 'protocol' for GEF-financed as well as other projects, and gearing up regional market development plans for other sources of 'carbon finance' (such as may be created under bilateral or multi-lateral arrangements whether or not the Kyoto Protocol becomes effective roughly by the end of the proposed projects in Burkina Faso and other countries.)

These considerations, as well as assignment of responsibilities for overall M&E and its sub-components, will be fine tuned during the course of further project preparation. The following table provides an indication of the types of indicators that would be incorporated in the M&E plan.

Market segment	*MARKET DEVELOPMENT INDICATORS*
Solar PV Investments	• Sales not financed or subsidized by the project • Performance and perceptions of market participants at different points in supply and service chains; foreign participants' interest • Percentage cost/price reduction at various levels in the supply chains • Cost/prices compared to regional and world markets • Varieties of systems available outside the project • Varieties of sales and financing terms offered • Codes, standards, and certification • Consumer protection mechanisms developed and accepted

[16] Similar considerations arise where an independent grid operator includes solar PV systems as a part of his/her service plan.

DSM/Grid-based RETs	• Regulations development for independent grids and for bulk sales to the main grid or independent grids • Reform of tariff structure conducive to EETs • Reform of payment and collection policies in the public sector
Technical Assistance/Capacity building (TA/CB)	• Number of participants, duration and commitment, cost-sharing • Studies completed and decisions taken by GoBF • Academic/training programs mainstreamed • Utilities and distribution concessionnaires adopt off-grid systems in their planning and marketing • Number of PV businesses certified by the project implementing unit. • Number of business plans developed under business support programs • Number of community-level participatory appraisals conducted.
	MARKET INTERVENTION INDICATORS
Solar PV Investments	• Direct sales (# of systems, kWp or kWt, $, terms of sales) • Geographic spread of customers • Size distribution of household PV systems • Amount of subsidies disbursed • Budgets of participating ministries for electricity services • Amount and sources of supplier financing
DSM	• Direct sales (e.g., # of higher-efficiency air-conditioners)
	MARKET SUSTAINABILITY INDICATORS
Solar PV Investments	• Consumer acceptance of PV systems as well as more generally of the criticality of electricity services in education, health, and local administration performance; • Incorporation of PV option in the business plans for grid electricity distributors (main or independent grids); • Pipeline development for future projects, and sourcing additional financing • Localization of assembly and service • Availability of end-user credit
DSM	• Shift to higher-efficiency appliance standards and local market availability • Availability of end-user credit • Development and acceptance of business and financing models for a wider range of EETs including higher-efficiency lighting systems

TA/CB	• Resource assessments completed, and a strategy for grid-capable RETs adopted • Standards and certification procedures for electrical equipment prepared and implemented as needed.

The indicators above are from the viewpoint of RE/EE market development. From the viewpoint of the 'indirect' development impacts and social benefits of electricity service provision to rural health and education facilities - irrespective of the supply technology - the performance indicators must be (a) consistent with those used in health and education sector projects - i.e., reflect on the quality of health and education services provided, not just the quality of electricity services provided - and (b) supportive of further development of those markets. During the course of further preparation, the indicators and measurement/reporting procedures, including for social benefits, will be clarified along these lines as part of an overall M&E plan in consultation with Bank colleagues and Burkinabe counterparts in the health, education, and rural development sectors. This would also draw upon the experience of M&E under other donor-supported projects, e.g. the EU-financed Regional Solar Programme and the 'solar village electrification' financed by the Spanish aid agency.

Incremental Cost Matrix			
	Baseline	**Alternative**	**Incremental**

Incremental Cost Matrix			
	Baseline	**Alternative**	**Incremental**
Domestic Benefits a. Investments DSM			Awareness and information barriers removed Greater efficiency in supply and service
Solar PV	Grant-driven programs fizzle out and there is a waste of resoutces Other off-grid market grows slowly, and primarily with diesel and kerosene Solar market small, product availability narrow, and near-exclusive dependence on imports for hardware and human capacity Private investors select diesel gensets for electricity provision to independent grids	Program improvements Expansion of large institutional PV market Introduction of household-size systems SHS and lanterns become available in several geographic markets Some private investors select biomass and micro-hydro options for independent grids for public distribution or for private industrial uses.	Acceptance of PV technology by users and financiers Cost reduction in PV and other RE technologies, and narrowing of cost gap with international market Successful demonstration of a range of technologies and business approaches
b. Capacity	Reliance on imports for equipment supplies and services, for a small, unpredictable market Little specific attention to making RE options viable for retail or grid-based applications. Limited private sector	Development of local commercial supply chains Public sector policy and regulatory capacity Private sector business development	Same as in the "alternative" case

Incremental Cost Matrix			
	Baseline	**Alternative**	**Incremental**
	development for RE supplies and services.		
Global environmental benefits	None	Offset of GHG emissions via avoidance of gasoline, kerosene, and diesel.	.23,200 tons of carbon emissions avoided
Cost by components (million US$)			
Investments (NPV terms)			
Solar PV	$8.4	$9.9	$1.4
DSM	$5.0	$5.5	$0.5
Capacity building/technical assistance	$1.7	$2.3	$0.6
Implementation/M&E	$0.7	$1.4	$0.7
total	$16.1	$19.3	$3.2
Note: In line with guidelines, the investment incremental costs are calculated as differences in NPV, hence the baseline and project cost estimates for the investment component here are different from the actual investment costs of the project.			

Annex 5
STAP Review

UNIVERSITY OF CALIFORNIA, BERKELEY

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March 9, 2002

To: Nikhil Desai, Richard Hosier, Christophe Crépin
Email: Richard.Hosier@undp.org, ndesai@worldbank.org, ccrepin@worldbank.org
From: Daniel M. Kammen
Re: Review of: Burkina Faso **Energy Sector Reform Project**
(Project ID: 069126)

Summary:

The goal of this project is excellent, to facilitate the development of a vital renewable energy market in Burkina Faso. Following on the lessons of renewable energy market stimulation efforts in other nations (e.g. Martinot, et al., 2001; Duke, et al., 2002) the capacity and policy lessons learned clearly signal that these sorts of programs are ready for widespread application. The project brief is vague in places, and there are a number of particular items listed in the comments below, but overall this project should be implemented. The high electricity tariffs (about 21 US cents/kWh makes this a natural market for renewables, where PV will already be directly cost competitive).

I recommend support for this project.

Major Comments:

The project focus on PV needs some added discussion. While it is clear that more focused – single technology – projects concentrate expertise and are therefore easier to manage successfully, there are some issues in the case of Burkina Faso that warrant additional analysis. As a researcher who has worked

extensively in the PV and biomass markets and industry in East Africa, I am keenly aware of the arguments that can be made *against* this broader market view (e.g. Duke *et al.,* 2020). Specifically the argument presented in the project brief that 'learning by doing' in the PV sector alone as a manageable beginning does have merit. The issue, however, is that in a country as poor as Burkina Faso the industry initially sponsored and supported will gain a tremendous market advantage over all potential competitors. It therefore makes a great deal of sense to, resources permitting, to maintain an active program in *at least* the biomass and potentially the wind sectors as well (e.g. Kammen, Bailis & Herzog, 2001; Kammen, 1999). This is consistent with the 'smart subsidies' plan discussed on page 11ff.

The arguments *against* the single technology focus include:

- Least cost clean energy development (wind and biomass are both considerably less expensive in many applications)
- A larger potential market stimulation package, where both electricity *and* mechanical work (e.g. wind water pumping and CHP applications from biomass) are potential technologies and services rendered.
- Greater diversification of the companies capable of providing services, thus reducing the very real danger that rural energy companies become the *de facto* local utility. The discussion of capacity on page 16 'Capacity' reflects the large potential for monopoly statu

Page 8: While the Government of Burkina Faso's Letter of Energy Sector Development Policy (December 2000) shows promise, many of the reforms indicated there are difficult to carry out, particularly in a poor, former monopoly systems with high levels of illegal power access. The primary means available to the World Bank to force compliance with the four points of power sector reform listed in the letter are the withholding of project funds. In the case of Burkina Faso, however, this may be a destructive rather an constructive approach. For example, the subsidy/transfer mechanisms discussed as part of the National Rural Electrification Fund are vague, and unlikely to provide private-sector investors the confidence that rural market will genuinely be open to them. At the same time, rural customers may rightly fear that the market transition is likely to lock in high rates from fossil or RET technology supplies. In this light, what *other* mechanisms can be build into the project to encourage genuine reform without leaving the power sector in an even worse state of affairs if privatization does not proceed as hoped?

While power sector reform (Section E.2, financial) is important, it remains to be seen if this is of central importance to the effort to provide rural energy. In many countries where full, or even partial, reform has *not* taken place (e.g. Kenya, Mexico, Sri Lanka) significant progress has taken place in building a renewable energy market. To be sure, often this is mainly a function of the failure of the state enterprise to provide rural energy services, but RET markets can clearly evolve in both restructured/deregulated *and* state/single-provider controlled markets.

General: The major obstacles to RET market evolution are probably *not* 'absorptive' [i.e. demand side issues] power so much as they are stable market opportunity where investment in RET businesses proves a better return on the investment than other pursuits.

Minor Comments & Clarifications:

Page 4: An estimate of the supply cost, and then the retail price of electricity, following the SONABEL extension via the West African Power Project should be included. This will help to clarify the prices that will make PV and other RETs competitive in the power market in Burkina Faso. [These cost reductions are not specified in footnote 1].

Page 12: “The project puts special emphasis on improving the life and income opportunities of the population, especially in the rural areas, which have been denied access to modern energy (90%)”. This is true in terms of access to energy, but it is unclear how this project, focused on PV, will substantially improve income opportunities (save for a few hotel owners who will benefit from lighting to attract clients”. Rural PV is primarily a service and quality of life issue (even factoring in the possible benefits of added time to study, hence time to stay in school for children in homes with PV systems.

Page 15: “Although the proposed project has components in three sub-sectors, its coverage is selective in that the main focus is on capacity-building assistance to the power sector in the areas of least-cost development, sector reform, improving reliability of power supply, and extension of access.”. Again, while this project is certainly one that should happen, it is not the case that PV provides the *least cost* option. It is an excellent option in many settings, including Burkina Faso, but it is rarely, if ever, the least cost option. I have noted this several time in the text so far, and will not continue to indicate this point in the later sections.

The use of ‘output’ based incentives (i.e. kWh of energy production and not W_p installed) is a critical step forward that this project can take. The implications of this are not mere rhetoric. Performance-based standards require significant long-term monitoring and follow-up to be effective, and the project budget will need to support this not only in terms of technical monitoring capacity, but also the ability to train local individuals and groups to perform this function.

Annex 1, page 25: It would be instructive to see Table 1 edited to reflect the demand deficit with and without the project.

Annex 2, page 30: How will sales of small and large PV systems be distributed? Will the same vendors be involved in both sales, or will these be separated into different entrepreneurial groups? The significance of this is that synergies between businesses are possible, and should be fostered, as opposed to competition alone.

Incremental Cost Analysis (File Burkina Faso ICA 030202 ND.xls)

Page 36, and on the Excel sheets: ‘Large System’, and ‘Small Systems’ the final cost/tC is relatively low (under $20/ton) because the assumed kerosene substitution values chosen are exceedingly high. The work of Kaufaman, Duke, *et al., (*Renewable Energy Policy Project Report http;//www.repp.org, 2001) found that much lower substitution values were representative for the majority of African nations.

Page 34; the discussion of biofuel options should include the means to evaluate and potentially support biomass based electricity generation.

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RESPONSE TO STAP REVIEWER'S COMMENTS[17]:

Comment "The project focus on PV needs some added discussion. .. It therefore makes a great deal of sense to, resources permitting, to maintain an active program in *at least* the biomass and potentially the wind sectors as well. (e.g. Kammen, Bailis & Herzog, 2001).

Response:. The apparently exclusive focus on PV investments may give an impression that the project is technology-focused. This is not the case. The choice of PV follows from the choice of market niches – critical electricity needs of off-grid public institutions and of households and commercial customers who otherwise spend significant amounts of money on low-quality lighting from kerosene and car batteries for small appliance use. This market can be served by DC power, and PV is eminently suited for such applications. There are other DC power technologies that are perhaps better suited for other markets, but at this point, the best opportunities for cost reductions and commercialized approaches to renewable energy promotion appear to lie in the DC power, and hence PV, market. The PV delivery chains are well-established and understood, there has been considerable donor support to PV applications in Burkina Faso and neighboring countries, and the PV market appears poised for a steady expansion.

Comment "The arguments *against* the single technology focus include:

Least cost clean energy development (wind and biomass are both considerably less expensive in many applications)"

***Response*:** Agree, in part, but it is debatable whether wind and biomass can meet the needs of the markets identified and addressed at this time in a least-cost manner, all costs considered. (See the comment above – the technology focus comes from market focus, not the other way around.) Cost comparisons in terms of cents/kWh delivered are not very meaningful for PV battery-charging versus wind or biomass AC power. The scale of applications is different, and hence also the geographical market. In the particular demographic/geographic markets selected, wind and biomass-based AC power technologies may well be attractive to some concessionaires of independent grids. At this juncture, the project's concern with such decentralized grids is more in terms of getting the institutional framework right and working, not promoting particular technologies. This is all the more so because of weak financial and technological intermediation mechanisms for grid-capable renewable energy technologies. They compete against diesel in a wide range of scale and applications – from 10 kW to MWs; in the context of the present project's objectives – expanding electricity access – their utility to a private investor may well be high, but is relevant only insofar as s/he chooses them for grid distribution applications. (That is, attractiveness of wind/biomass technologies for uses other than expanding access is not the focus of this project.)

As the power sector reforms take hold, as the decentralized electrification (mainly, a combination of independent grids and PV systems) concept is accepted by the Burkinabe, as the financial intermediation channels are strengthened, a broader renewables-promotion program can be mounted. This is indeed the purpose of the TA and capacity building activities outlined in the project brief. Unlike regulated power systems with detailed cost disclosure requirements, decentralized electrification does not - and cannot - depend on external judgments of what 'least cost clean energy development' might be; the buyer of a PV system or a wind generator decides whether it is 'least cost' to him/her.

[17] The Reviewer's comments are based on a pre-final version of the Project Brief, so page references in the Review do not match the final version; also, the Reviewer's concerns about remaining 'gaps' have been addressed in the final version.

Comment "A larger potential market stimulation package, where both electricity *and* mechanical work (e.g. wind water pumping and CHP applications from biomass) are potential technologies and services rendered."

Response: Agree in concept, but not in practice at this time. There is a relatively large EU-financed Regional Solar Program in several West African countries that focuses exclusively on solar water pumping. (Phase I was completed in 2000; Phase II has just been prepared.) No doubt there would be markets for wind water pumping and CHP for biomass; the critical question to be answered is, "What are the opportunities for scaling up and rapid cost reductions in order to expand access?" In some other parts of the world, wind and biomass power (or CHP) can contribute to the main grid supplies; this does not seem to be the case at this point in Burkina Faso. Associated UNDP/GEF technical assistance and capacity building activities will look into CHP applications from biomass.

Comment "Greater diversification of the companies capable of providing services, thus reducing the very real danger that rural energy companies become the *de facto* local utility. The discussion of capacity on page 16 'Capacity' reflects the large potential for monopoly status."

Response: Disagree in part. PV and AC power RETs are for two fundamentally different markets, so PV investments do not in any way inhibit the potential for diversification. On the other hand, independent grid operators may choose to include PV systems as a part of their supply plan. There is nothing undesirable per se in that rural energy companies - meaning, concessionaires of independent grids - would become *de facto* local utility. Where conditions of natural monopoly permit, regulated utilities are the answer. Whether they would have a *de facto* monopoly on PV service as well in their concession areas is not yet clear. The key issue is whether these utilities have the incentives to reduce costs and expand access. Re-bidding of concessions may in part reduce these risks. No general judgments can be made at this point; much depends on the economic geography of the concessions and the cost structures. This is why it is critical to establish workable institutional framework first, but not lose sight of challenges and potentials down the line.

Comment: "Page 8: While the Government of Burkina Faso's Letter of Energy Sector Development Policy (December 2000) shows promise, many of the reforms indicated there are difficult to carry out, particularly in a poor, former monopoly systems with high levels of illegal power access…. For example, the subsidy/transfer mechanisms discussed as part of the National Rural Electrification Fund are vague, and unlikely to provide private-sector investors the confidence that rural market will genuinely be open to them. At the same time, rural customers may rightly fear that the market transition is likely to lock in high rates from fossil or RET technology supplies. In this light, what *other* mechanisms can be build into the project to encourage genuine reform without leaving the power sector in an even worse state of affairs if privatization does not proceed as hoped?

Response: Agree. There is a risk that private sector interest in supplying grid electricity service to rural markets may be limited. As for the rural customers' fear that market transition might lock in high rates, indeed this may happen, with the curtailment of Sonabel's current ability to cross-subsidize existing independent grids from the two larger grids. However, promotion of new independent grids will require that beneficiary households bear the high costs of service (some of which may be lowered via use of subsidies). Privatization of the existing Sonabel operations is not, in and of itself, directly relevant to whether independent grid operators and PV suppliers can be attracted; rather, changing the 'rules of the game' a la 'minimum policy platform' is central to stimulating sustainable access expansion. (Note that the 'minimum policy platform' is silent on ownership of the main grid.) Reducing the costs of grid expansion – which can be used in both main grid as well as independent grids – for low-voltage consumers is key to tackling the grid-based access problem; subsidies only play a supportive role.

Comment: Page 18: While power sector reform (Section E.2, financial) is important, it remains to be seen if this is of central importance to the effort to provide rural energy. In many countries where full, or even partial, reform has *not* taken place (e.g. Kenya, Mexico, Sri Lanka) significant progress has taken place in building a renewable energy market. To be sure, often this is mainly a function of the failure of the state enterprise to provide rural energy services, but RET markets can clearly evolve in both restructured/deregulated *and* state/single-provider controlled markets.

Response: Disagree. It is the premise of the project that lack of power sector restructuring - demonopolization, level playing field, cost-reflective tariff mechanisms, 'smart' subsidies - is an impediment to rural electricity access. Whether it is also an impediment to renewable energy technologies is debatable. For PV systems alone, it is perhaps the case that markets can be expanded even without reforms of the main power sector; such is certainly not the case for many grid-capable RETs. "Reforms" is not merely 'privatization of a national monopoly with a limited market'. The key challenge in the project concept here is to see how RETs can fit in the overall framework of sector reforms and accelerating access expansion, not how sector reforms and access expansion can fit in an RET promotion program.

Comment: "General: The major obstacles to RET market evolution are probably *not* 'absorptive' [i.e. demand side issues] power so much as they are stable market opportunity where investment in RET businesses proves a better return on the investment than other pursuits."

Response: "Disagree on the first point. The absorptive capacity is very limited, and will not grow in the absence of broad-based economic growth. Agree on the second point. There is no way to ensure that private investment would flow in electricity or RET compared to, say, running hotels or making beer. The issue here is, "If there were private investments in electricity service provision, what would it take to switch them to renewable sources of electricity, especially where there might be an opportunity to lower the costs, expand the markets, and meet some developmental needs"? With sufficient incentives – and, more to the point, removal of disincentives – and entrepreneurial capacity, if the market grows, investors will come in.

Minor Comments & Clarifications:

Comment: "Page 4: An estimate of the supply cost, and then the retail price of electricity, following the SONABEL extension via the West African Power Project should be included. This will help to clarify the prices that will make PV and other RETs competitive in the power market in Burkina Faso. [These cost reductions are not specified in footnote 1]."

Response: Bulk power supplies to the Bobo-Ouaga interconnected grid are likely to come in at about 5-6 US cents/kWh. Retail prices cannot be predicted at this time. The entire cost structure of Sonabel needs to be examined in view of interconnections and past and future investments. In any event, PV market is not likely to be affected by retail tariff levels on the Bobo-Ouaga grid. Retail tariffs on independent grids will vary according to cost and load patterns.

Comment: "Page 12: "The project puts special emphasis on improving the life and income opportunities of the population, especially in the rural areas, which have been denied access to modern energy (90%)". This is true in terms of access to energy, but it is unclear how this project, focused on PV, will substantially improve income opportunities (save for a few hotel owners who will benefit from lighting to attract clients". Rural PV is primarily a service and quality of life issue (even factoring in the possible benefits of added time to study, hence time to stay in school for children in homes with PV systems."

Response: Agree. Income and employment impacts of the project would come primarily from grid electricity supplies.

Comment "Annex 2, page 30: How will sales of small and large PV systems be distributed? Will the same vendors be involved in both sales, or will these be separated into different entrepreneurial groups? The significance of this is that synergies between businesses are possible, and should be fostered, as opposed to competition alone."

Response: Agree. It would be up to the PV dealers to decide what type/size systems they want to sell. However, it is up to businesses to find and exploit their synergies.

Comment: Page 36, and on the Excel sheets: 'Large System', and 'Small Systems' the final cost/tC is relatively low (under $20/ton) because the assumed kerosene substitution values chosen are exceedingly high. The work of Kaufaman, Duke, *et al., (*Renewable Energy Policy Project Report http;//www.repp.org, 2001) found that much lower substitution values were representative for the majority of African nations.

Response: There is no 1:1 relationship between kerosene displaced for lighting and SHS (the larger ones of which will be used not just for lighting but for radio and TV). Rather, commercial SHS market develops when people are otherwise spending significant amounts of money on kerosene lighting and battery services – say, US$7-10 a month. In the calculations for the 35 Wp systems prepared here, kerosene is in part a proxy for fossil-fuel based battery charging services. In the calculations for the 10 Wp systems, kerosene displacement is taken to be only 0.2 liters per household per day, which is not at all 'exceedingly high'.

As for comparison with Kaufman, et al., averages are useful in average circumstances. Unlike Asia and Latin America, where the SHS promotion is aimed at marginal communities, in sub-Saharan Africa, it is aimed at the top 10% of the income in rural areas, nearly all of which are unelectrified. The project household PV market segment is likely to be even narrower than the top 10%. That is, in sub-Saharan Africa, the market profile for the SHS customers (35 Wp and above) is significantly different from that in other regions. Project monitoring and evaluation (M&E) will include provisions for careful profiling of SHS buyers and potential purchasers.

Comment "Page 34; the discussion of biofuel options should include the means to evaluate and potentially support biomass based electricity generation."

Response: Agree. Bank-led investments in biomass-based electricity generation may be considered in a subsequent project if the TA/capacity building activities supported under this project point to such opportunities.