

PD-BAX 203

UNITED STATES GOVERNMENT

memorandum

DATE: July 30, 1985

REPLY TO
ATTN OF: M. Sullivan - GDO/Burundi

SUBJECT: Project Paper Amendment ^{2/1}

TO: AFR/PD/IPS, ~~George Rublet~~

Please find enclosed copy of Project Paper Amendment for Alternative Energy: Peat II (695-0103). Please do the necessary distribution. Thank you for your assistance.

Official File Copy

APPENDIX 3A, Attachment 1
Chapter 3, Handbook 3 (TM 3:43)

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT DATA SHEET

1. TRANSACTION CODE

A = Add
 C = Change
 D = Delete

Amendment Number

1

DOCUMENT CODE

3

COUNTRY/ENTITY: BURUNDI
A. BUREAU/OFFICE: AFRICA 06
3. PROJECT NUMBER: 695-0103
5. PROJECT TITLE: ALTERNATIVE ENERGY: PEAT II

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM DD YY 03 31 87
7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4):
A. Initial FY 86 B. Quarter 4 C. Final FY 86

8. COSTS (\$000 OR EQUIVALENT \$) =

A. FUNDING SOURCE	FIRST FY 80			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	1,800	200	2,000	4,202	4,798	9,000
(Grant)	(1,800)	(200)	(2,000)	(4,202)	(4,798)	(9,000)
(Loan)	(-)	(-)	(-)	(-)	(-)	(-)
Other U.S. 1. 2.						
Host Country	-	306	306	-	1,775	1,775
Other Donor(s) Ireland	110	-	110	1,485	-	1,485
TOTALS	1,910	506	2,416	5,687	6,573	12,260

9. SCHEDULE OF AID FUNDING (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) SDA	743	878	-	8,000	-	1,000	-	9,000	-
(2)									
(3)									
(4)									
TOTALS				8,000	-	1,000	-	9,000	-

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 873 874
11. SECONDARY PURPOSE CODE: 753

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each):
A. Code: BU BL
B. Amount:

13. PROJECT PURPOSE (maximum 480 characters):
To strengthen ONATOUR's capacity to produce and aggressively market peat as an alternative fuel, considering all possible markets but initially concentrating on those in which peat will be most cost-competitive.

14. SCHEDULED EVALUATIONS: Interim MM YY 12 82 MM YY 09 84 Final MM YY 09 86
15. SOURCE/ORIGIN OF GOODS AND SERVICES: 000 M1 Local Other (Specify) 935

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ___ page PP Amendment.):
The purpose of this project amendment is to redefine the project's purpose, outputs and inputs to reflect more accurately the activities which are being undertaken now and which will be accomplished between now and the completion of the project.

17. APPROVED BY: George T. Bliss
Title: AID Representative to Burundi
Date Signed: MM DD YY 07 18 85
DATE DOCUMENT RECEIVED IN AID/W. OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY 11 11 11

BURUNDI - ALTERNATIVE ENERGY: PEAT II

PROJECT PAPER AMENDMENT

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ABBREVIATIONS AND ACRONYMS

AID/W	Agency for International Development/Washington
BNM	Bord na Mona, the Irish Peat Board
FBu	Burundian Franc (\$1.00 = FBu 125)
GOI	Government of Ireland
GRB	Government of the Republic of Burundi
ha.	hectare
IRR	Internal rate of return
km.	Kilometer
MT	Metric ton
OAR/B	Office of the AID Representative/Burundi (Bujumbura)
ONATOUR	National Peat Office (Office Nationale de la Tourbe)
PIO/C	Project Implementation Order/Commodities
PP	Project Paper
PSC	Personal Services Contract(or)
REDSO/ESA	AID's Regional Economic Development Services Office/ East and Southern Africa (Nairobi)
REDSO/WCA	AID's Regional Economic Development Services Office/ West and Central Africa (Abidjan)
UNDP	United Nations' Development Programme

I. BACKGROUND AND RATIONALE FOR PROJECT AMENDMENT

A. Background of the Project

AID's support to the Government of Burundi's (GRB's) National Office for Peat (ONATOUR) was initiated on a pilot basis in August 1978. Under the Africa Regional Accelerated Impact Program's Alternative Energy: Peat I Project, \$490,000 was provided to assist ONATOUR in developing Burundi's peat reserves for non-industrial, thermal energy requirements. At that time, the beneficiaries of this new source of fuel were identified as the rural majority who would be encouraged to substitute peat for wood in cooking and heating for the rural household. Following two years of experience under this activity, it was concluded that, given the inefficiencies of the wood-to-charcoal conversion process (7 kilos of wood produce 1 kilo of charcoal), priority attention should be redirected towards consumers of charcoal, who are primarily urban householders. Concurrently, although peat production was proceeding on a number of bog sites, a number of technical questions had surfaced which required additional study and experimentation. Equally importantly, as ONATOUR began its producer-wholesaler operation, it experienced growing pains. It was therefore considered appropriate to address these constraints with a longer term commitment of AID resources.

The follow-on project, Alternative Energy: Peat II, was authorized by the AA/AFR in August 1980. The project was, and continues to be, directed towards the goal of maximizing the effective utilization of Burundi's limited energy resources by developing an underutilized resource - peat. The project had two purposes: (1) to conserve the country's forestry reserves by increasing the availability and acceptability of peat as an alternative energy source and (2) to strengthen the institutional capacity of ONATOUR to carry out present and planned operations on an efficient basis without the need for significant future financial or technical support. It was expected that achievement of the project purposes within the five-year period of the project, August 1980 to September 1985 (though recently extended to March 1986), would have a positive impact on the project goal.

The underlying project rationale held that, by increasing the amount of peat commercially available and by concurrently stimulating a demand for its use, an increasing share of the solid fuel market could be converted to the use of peat. This would in turn reduce pressure on the forest reserves which, as the primary source of fuel, were supposedly being rapidly depleted. As an essential correlation, it was judged equally important to strengthen ONATOUR, the parastatal institution which had been established in 1977 under the jurisdiction of the GRB Ministry of Public Works, Energy and Mines. The development of ONATOUR as an efficiently functioning and financially viable institution was considered a necessary condition for the effective implementation of this project as well as for ONATOUR's expansion into other peat-related activities.

The project was designed with four outputs which would indicate achievement of the project purposes:

- . Trained ONATOUR staff;
- . Improved ONATOUR management capability;

- Resolution of technical questions concerning production methods and household stove technology; and
- Development of six commercial peat bogs with an annual production level of 47,000 MT by the project's completion, at which time approximately 60% of Bujumbura's urban domestic market would be using peat.

The experimental nature of many aspects of the project necessitated, in the course of its design, the formulation of a series of critical assumptions regarding market behavior, production and stove technologies and GRB support of ONATOUR's financial and operational needs. These assumptions formed the basis of design linkages between planned inputs and projected outputs.

The Market:

- The decreasing availability of wood and subsequent rapid escalation in the price of fuel wood and charcoal, particularly in areas around the capital, would place an increasingly heavy burden on the disposable income of large numbers of the poorer urban dwellers.
- As fuel wood and charcoal became less available and more expensive, the urban dweller would be obliged to seek an alternative fuel source. Peat would be the most logical substitute.
- Projected increases in the price of fuel wood and charcoal would place the market price of peat approximately 10% below the price of charcoal by 1981. The price differential would widen dramatically, in favor of peat, by 1985.
- Given the consumer's financial incentive to purchase peat rather than other alternatives, a target of converting 60 percent of Bujumbura's households to the use of peat by the scheduled completion of the project appeared realistic.
- During the initial years' development of the urban domestic market, peat revenues would be assured through sales to large institutions and to two FED-financed tea factories.
- The existing transport-wholesale-retail chain for charcoal and wood would also be utilized for peat. This would minimize expense to both ONATOUR and the consumer, as well as reduce the uncertainty of developing new marketing distribution networks. ONATOUR would be effectively limited to a production-wholesale operation, maximizing the sale of peat from the bog site.

Production and Stove Technologies

- . The proposed peat-macerating equipment would be found appropriate and adaptable to the bog conditions in Burundi.
- . A low-cost stove, suitable for mass production by local artisans and acceptable to the urban public, would be available in the second year of project implementation.

GRB Support

- . ONATOUR's management would be given sufficient leeway to make decisions along sound management lines, guided by sound business practices.
- . The GRB would cover, in a timely fashion, ONATOUR's financial short-falls until such time (estimated as 1985) as ONATOUR could cover its operating costs from peat revenues.

B. Project Performance to Date

In designing the project, AID and ONATOUR estimated requirements for specialized skills, both long-term and short-term, to strengthen ONATOUR's headquarters staff, to increase peat production at the bog sites and to create a growing demand for the new product. Under personal services contracts (PSCs), AID recruited a marketing advisor (filled since February 1981), a financial advisor (filled since May 1982) and an administrative advisor (filled from March 1982 to May 1984). To direct peat production on the bog sites, a somewhat unusual arrangement was agreed to between Bord na Mona (BNM), which is the Irish Peat Board, the GRB and AID. Under a host country contract financed by the Irish Government and AID, let in August 1981, Bord na Mona has provided the services of Irish engineers, fitters (master mechanics), and surveyors. For technical problem-solving, both AID and Bord na Mona have provided short-term services in engineering, consumer marketing, social analysis, stove design, construction, private sector development and evaluation.

After nearly four years of project implementation experience, careful internal and external analyses of progress indicate that many of the initial project design concerns and uncertainties have been satisfactorily resolved. Others, however, especially in the areas of marketing and stove technologies, continue to require attention.

ONATOUR is now fully staffed with qualified and competent senior management personnel who are accorded sufficient leeway to make policy and operational decisions based on sound business practices. The senior management staff is directed by the Director General and two assistant directors, one for administration and finance and the other for technical and commercial services. The managerial staff totals 28, and six of seven department chiefs have university degrees in such fields as economics, mining and engineering, law and ecology. Two senior staff members are presently studying business administration and civil engineering in Ireland. There are also 120 staff employees, including four bog managers, two sub-foremen

and four mechanics. A complement of 518 day-workers, primarily employed during production seasons, provides manual labor at the bog sites and at ONATOUR's central peat storage facility in Bujumbura. With this personnel organization plus a fully functional central headquarters (87% financed with AID project funds) and office, storage and maintenance facilities at each of the bog sites, ONATOUR now has the institutional infrastructure to carry out its mandate: the exploration, exploitation and commercialization of peat reserves in Burundi.

The GRB has met, and continues to meet, its financial obligations to ONATOUR on a regular and timely basis. The GRB's subsidies to meet ONATOUR's operating shortfalls total the equivalent of \$1,775,000 to date. This is favorably compared to the estimate of \$1,089,000 which was calculated in the design of the project.

The technology of peat production, adapted to both Burundi's bog conditions and market needs, has been tested and is now in large-scale operation. With the arrival of peat macerating machinery and tractors from Ireland, the arrival of the Irish technicians and ONATOUR's recruitment of counterpart personnel and manual labor, peat production commenced in earnest in 1982. Burundian nationals are continuing to be trained in all aspects of bog management, peat production and machinery maintenance. Production in 1984 totalled more than 13,000 MT, and production capacity is now estimated at 25,000 MT per year. The only major constraint to expanding production beyond the present level lies in the capacity of the market to absorb increased volume.

At present the market demand for peat is being adequately met by production from four southern bogs: Ijenda, Gisozi, Matana and Gitanga. If sales volume increases, however, it is obvious that production from the southern bogs alone will be insufficient to meet demand. The vast, untapped peat reserves of the Nyamuswaga Valley - estimated at 4-5 million tons - present a logical target for expanding peat production. Currently less than 10% of the valley's surface area of approximately 1,300 ha. is under agricultural production. Most of the surface area remains unexploited because of high water levels and seasonal flooding. Additional considerations supporting the development of these peat reserves include the superior quality of Nyamuswaga peat, the transport savings to be derived in supplying peat to ONATOUR's rapidly expanding northern markets and lower production costs resulting from the concentration of production in one large bog.

In the course of considering development of the Nyamuswaga Valley for peat exploitation in 1982-3, several critical issues surfaced: the technical feasibility of peat production, the environmental impact on the region and the valley's high agricultural potential. To address these concerns, a two-year, project-funded study of the valley basin was initiated in June 1983. In the first phase of the study topographical, hydrological/hydrogeological, geotechnical and related field test data are being collected and analyzed. In the second phase of the study, these data will be used to produce a technically and environmentally sound drainage scheme for the valley which will permit the efficient production of peat over the long term while assuring that agricultural development, both upstream and downstream of the production area, will not be adversely affected. The scheme will also provide for reclamation of the bog for agricultural purposes following peat extraction.

The study is progressing well to date. An extensive topographical survey of the valley was completed in June 1984. The required geotechnical work was completed in August 1984, and during July-September 1984, a pilot drainage scheme was implemented. A total of 12.2 kilometers of drains was installed covering an area of 38 hectares. Production tests were conducted on five pilot areas, and 88 tons of peat were extracted. In considering the agricultural potential of the valley, tests were also initiated to determine the feasibility of integrating peat and agricultural production. Farmers in two communes were encouraged to cultivate rice on an additional 39 hectares which were prepared as drainage test sites. Progress of the rice crop is being closely monitored. Detailed analyses of rainfall and water level and flow measurements were started in October 1984. Finally, the first-phase report, "Nyamuswaga Development Plan: Proposals for Field Work and Experimentation in the Upper Nyamuswaga Valley, 1985" was completed and presented in March 1985.

As discussed above, the urban domestic householder had been identified as the target customer for peat. The design, mass production and dissemination of a low-cost, socially acceptable and technically sound peat stove was agreed to be the key to penetrating this market. By June 1982 several portable stove prototypes had been developed and laboratory-tested under the direction of the Marketing Advisor and several short-term stove specialists. In May 1982 an aggressive promotion and publicity campaign was launched to increase the urban householders' awareness and acceptance of peat as a viable domestic fuel. To encourage householders to try peat, a "free" peat stove was offered with each initial purchase of peat. ONATOUR's marketing staff made regular home visits to all new customers to personally explain and demonstrate proper peat utilization. Peat use demonstrations were also conducted at Bujobura's public markets. Customers' questions were addressed and objections carefully noted. Billboards were constructed and publicity spots taken on the radio and in the newspaper. To ensure the householders' ready access to peat, sales stands (kiosques) were erected at local markets. Free household delivery of peat was also provided.

After 18 months of the domestic market campaign, more than 1,000 peat stoves had been distributed, and 520 individual households had experimented with peat as a fuel source. Thousands of additional households had witnessed the use of peat. Domestic sales during this period totalled 60 MT. Unfortunately the attrition rate of the early adopters was very high. Analyses of data indicate that less than one-third of the households repeated their initial purchase of peat. Six months following the initial purchase, only 8% of the early adopters continued to use peat. This figure fell to 3% after a period of 12 months. On an average, a family had used 117 kilos of peat over a period of nearly two months before discontinuing its use.

Although the domestic campaign was unsuccessful in significantly expanding sales, the experience provided ONATOUR with important insights into the behavior of the urban household fuel market. The urban population is surprisingly willing to try both peat and the peat stove. While the urban householder is very cost-conscious, price incentives alone will be insufficient to convince him to use peat. Further improvements must be made in the product, packaging and durability of the peat stove. Product distribution, service and personal client contact will also be essential elements in off-setting the fuel wood/charcoal trade's present hold on the market.

C. Rationale for the Project Amendment

In the original design of the project, peat production and marketing targets were proposed which have proven, after four and a half years of implementation experience, to be unrealistic within a five-year timeframe. In addition, some of the project assumptions on which the targets were based have not proven valid. On the other hand, and to the credit of the original project designers, the potential limitations of successful implementation within only five years were recognized and discussed:

In the course of design, it became increasingly evident that there is an experimental nature to many aspects of the project. Marketing a new product, especially one that is rather basic to household lifestyle, may be a process fraught with obstacles. Although the production technology is much more certain, a question remains about the adaptability of semi-automatic peat macerating machines to the bog conditions in Burundi. In addition, there are uncertainties regarding other aspects of the project -- ability to link up with the charcoal transport-wholesale-retail chain; concern with ONATOUR staff's acceptance of the proposed operating philosophy; concern for the ability to develop a low-cost cooker/stove, the artisan workshops that will manufacture it and a public willing to purchase it; and most importantly, an uncertainty that price incentive will be sufficient to convert the potential consumers of peat from wood and charcoal (PP, p.14)

Although the importance of the urban domestic market is unchallenged, ... there are other markets which will account for the bulk of peat sales during the initial years. These include the artisanal/commercial (bakeries, brick manufacture, lime kilns), institutional (armed forces, hospitals, missions) and industrial (tea factories) markets. (PP, p.11)

Two formative evaluations of the project have been undertaken. The first was completed in December 1982. The second was completed in September 1984 and examined implementation progress to date from various perspectives: institutional, financial, economic (peat marketing program, pricing policy, etc.), and technical (peat production, reclamation and environment-ecology). In addition to its specific implementation-related recommendations, the evaluation team concluded that the Project Paper should be amended to redefine the project's purpose, outputs and inputs to reflect more accurately what activities are being undertaken now and what will be accomplished between now and the end of the project. Concurring with this recommendation, and in collaboration with ONATOUR and the technical advisory team, the Office of the AID Representative to Burundi (OAR/B) has prepared this amendment. Based on a realistic assessment of the status of implementation and future planning, including growing interest by other donors in supporting ONATOUR's mandate, this PP amendment also justifies an extension of the Project Assistance Completion Date for one year, from March 1986 to March 1987, and a final increment of funding.

II. DESCRIPTION OF THE AMENDED PROJECT

A. Project Goal and Purpose

The goal of the project remains valid and appropriate: to maximize the effective utilization of Burundi's limited energy resources. A measure of goal achievement is simply the increased use of peat as an alternative form of energy, which can be verified by analyzing peat production and sales statistics. It is assumed that the GRB will remain committed to encouraging the use of peat as an alternative to wood, charcoal and fuel oil. The original purposes of the project have been re-evaluated in light of implementation experience. The redefined purpose is now more explicit and accurately reflects the direction which the project is now taking and will take over the next two years: to strengthen ONATOUR's capacity to produce and aggressively market peat as an alternative fuel, considering all possible markets but initially concentrating on those in which peat is most cost-competitive. By the end of the project, in March 1987, the following conditions will indicate that this purpose has been achieved:

- ONATOUR will be fully functional with a trained managerial and technical staff;
- an effective, aggressive peat marketing strategy will have been developed and an initial campaign will have been launched; and
- peat production and reclamation efforts will be continuing smoothly.

Assumptions for achieving this purpose are that (1) the use of peat proves acceptable to both commercial and domestic consumers, (2) the combustion properties of Burundi's peat will prove to be of sufficient quality to make it an economical fuel alternative in all potential market segments, (3) revenues from peat sales will cover ONATOUR's operating costs.

A revised Logical Framework is attached as Annex A.

B. Conceptual Framework and Methodological Approach

As discussed above, the original design of the project was based on assumptions and implementation parameters which have not proven to be valid. The most specific, and perhaps critical assumption on which the project was designed was that wood and charcoal would, within five years, become increasingly scarce as a source of fuel and, concurrently, increasingly expensive to the consumer. This has not proven to be true. Implementation of the project will therefore now be redirected towards new and more realistic marketing and production targets. ONATOUR's approach in both areas must be revised to deal with the reality of the wood/charcoal market in Burundi today and in the near term. ONATOUR's methodological approach will be three-pronged:

(1) to maximize sales volume by introducing peat to as many different kinds of clients as possible and especially to the larger consumers.

Interest in promoting and supporting the use of peat as a substitute for charcoal in the urban domestic market remains a priority. However, an even

higher priority, and recognized in the original design of the project, is assuring a steady demand for the product among the institutional, artisanal/commercial and industrial market segments. This will not only serve to stabilize and probably significantly increase the present demand for peat but also provide an assured revenue base for ONATOUR. ONATOUR must make its best effort at least to break even financially in case the GRB is unable to meet its operating shortfall at some point in the future. It is important to note, though, that ONATOUR has come close to covering its operating costs with its revenue from peat sales in each year since 1982.

(2) In order to maximize sales volume, it will be necessary to build a capability within ONATOUR to respond to requirements for wood/charcoal-to-peat conversions, delivery/services and financial and technical support to enable ONATOUR to compete in a price-conscious market.

As discussed above, wood and charcoal continue to remain in abundance and continue to be sold at acceptable prices. To penetrate the existing energy market, ONATOUR must therefore develop additional, appropriate market incentives to convince the energy consumer to switch to peat as a primary source of fuel. In short, ONATOUR is now challenged with creating demand for its product in direct market competition with fuel wood, charcoal, electricity, fuel oil, biogas, etc.

(3) to continue peat development and production operations.

This component of ONATOUR's approach is essential to meet a growing market demand for peat. If several additional larger consumers are drawn from the industrial and institutional and/or artisanal/commercial market segments, ONATOUR must be prepared to meet the demand. This will mean not only sustaining production capacity at the southern bogs but also bringing areas of the Nyamuswaga Valley bog into commercial production.

The significant variable in this methodological approach is the price of wood. Wood-pricing studies, undertaken by ONATOUR in coordination with other donors, have identified the actual costs of wood replacement. These studies have been provided to the ministers of the Ministry of Public Works, Labour and Mines and the Ministry of Water and Forests, supported by personal contacts by OAR/B. Based on this information, the GRB is considering a substantial increase in the cost of wood-cutting licenses. ONATOUR and OAR/B will continue to monitor the wood price situation closely.

Given the promising progress to date, the frank appraisal of problems remaining to be confronted and the investment of financial and technical resources which have been provided to date, it is in AID's interest to assist ONATOUR in redirecting its efforts and undertaking its new, pragmatic methodological approach. To achieve the new marketing and production targets will take more time than originally estimated. As the project outputs have been redefined, it is now estimated that implementation must proceed over the next two years, until March 1987. There is also the strong possibility that within the next two years, and especially if ONATOUR is successful in implementing its approach, other donors will become interested in supporting the use of peat. More specifically, the UNDP may support ONATOUR's recent initiatives in the use of peat in agricultural production in terms of both bog reclamation and as a soil conditioner with fertilizer additives. Also the World Bank may loan-finance the conversion of at least one industrial

operation to the use of peat, especially if convinced that ONATOUR can provide technical back-up and problem-solving and a reliable supply of high quality peat.

C. Realigned Project Outputs and Inputs

ONATOUR, OAR/B and the technical advisory team agree that the following outputs accurately reflect the current status of project implementation since the beginning of the project and what can be accomplished by the scheduled completion of the project in March 1987.

1. On-the-job, third country and U.S. training provided to ONATOUR's managerial and technical staff in: marketing, financial management and analysis, bog management, mechanics, quality control, laboratory analysis, engineering and stove conversions

Major emphasis has been, and will continue to be, placed on U.S., third country and on-the-job training, especially the latter. A listing of ONATOUR's managerial and technical staff, including their levels of formal education and the type of training which has been provided to them through the project, is attached as Annex C. By the end of the project, the following ONATOUR personnel will have been trained: 2 marketing specialists, 2 financial managers/analysts, 5 bog managers, 8 mechanics, 2 laboratory technicians, 1 general engineer and 2 stove conversion teams. In addition, the ENM team will continue to train machine operators, welders, storekeepers (tools), storekeeper aides and other personnel necessary to maintain peat production at multiple bog sites. The training of the mechanics in truck maintenance and repair will also continue.

The revised project budget includes funding for additional, short-term training in third countries. This will permit ONATOUR personnel to attend short technical courses and relevant seminars and workshops outside of Burundi. No additional long-term training will be provided. Instead, ONATOUR has recently requested the Government of Ireland to finance some long- and short-term participant training in technical fields.

2. Continued development of a marketing information system

Faced with the challenge of creating a market demand for peat, ONATOUR finds it essential to expand its limited market data collection efforts. ONATOUR decision-making requires the design and use of a functional marketing information system. The system will be based on data collected to date and will include the following minimum components:

- a product profile (per market segment) including data on product flows by monthly highs and lows, storage requirements, storage shelf-life, etc.;
- a market profile (per market segment) including data on energy requirements, service needs, sales histories, potential client lists, client attitudes among peat adopters and non-adopters, etc.;

- a competitive energy profile including data on alternative energy sources, pricing structure, distribution networks, long-term supply projections, etc.;
- a facility profile including data on storage capacity needs, ONATOUR and client reserves, road access, quality control, etc.; and
- a cost profile including data on bog storage, loading, transport, unloading, losses, stove conversions, etc.

The profiles will be updated on a regular basis, and summary materials will be readily available to ONATOUR management. To assist ONATOUR in designing and using this marketing information system, the services of the Marketing Advisor will continue through the completion of the project, i.e. for another two years. It should be noted that this task is only one of several major tasks in the Marketing Advisor's position description. The other tasks are discussed below in relation to the other project outputs. Funds will also be used to procure a pick-up truck to be used by the ONATOUR Marketing Service to assure continued mobility in collecting data for the system.

3. ONATOUR's in-house capability to design and convert stoves, boilers, ovens and kilns for peat use strengthened

The need to design efficient, low-cost peat stoves was foreseen in the original design of the project. However, despite serious efforts to date, the development of peat-burning units requires further experimentation and field testing. Project experience has shown that few, if any, existing wood-, oil- and charcoal-burning units in Burundi can be efficiently converted to peat without retrofitting at substantial cost. In addition, local materials have proven inadequate and inappropriate for conversion needs. The required materials, such as cast iron, must be imported. ONATOUR presently has a limited capacity for retrofitting only small stoves. Stove conversions, primarily in schools, prisons and bakeries, have been successfully undertaken at costs ranging from \$275 to \$1,375 per unit.

ONATOUR's technical and financial capability to convert institutional, artisanal and industrial stoves to peat use will be strengthened by providing 30 person-months of additional, full-time stove design/conversion technical services. This will include the services of a stove designer for 18 months (now on board under a PSC) and the services of a boiler specialist for 12 months (under the EMB contract). Project funding will also be provided to procure imported cast iron bars and grates, local stove construction materials and a small amount of stove-testing equipment. The two technical advisors will be responsible for the on-the-job training of two stove conversion teams. Each team will include a mason, a welder and a stove design technician, all Burundian. The teams will be provided with a four-wheel drive vehicle and the necessary tools for stove conversions.

The firing of artisanal brick kilns with peat has been successfully conducted by the GBB National Housing Office. Although the method must still be perfected, ONATOUR's Marketing Service has high prospects for this new market. The use of peat-fired brick kilns will be further developed by an experienced Burundian brickmaking team which will be recruited and financed through the project.

The generation of low-voltage, low-voltage electricity is another energy market which has only recently been explored by ONATOUR. Throughout the interior of the country, thousands of small institutions (schools, hospitals, missions, government offices, etc.) rely heavily upon expensive, imported diesel fuel to generate electricity. To assist ONATOUR to explore further this potential market, funding is provided for the purchase of a mobile peat gasifier test unit and one person-month of technical expertise to conduct initial combustion demonstrations and tests. The specialist will also train ONATOUR's technical staff to operate and maintain the test unit for continuing demonstrations throughout the country.

As ONATOUR becomes more systematic and technically sophisticated in its approach to converting wood-, charcoal - and fuel oil-fired combustion units to peat use, specific technical data regarding Burundian peat and its particular combustion properties will be required. Although various analyses have been conducted in past, a concise, in-depth analysis is still lacking. To both address this lack and to provide the technical team with valid and reliable data on which to base their work and experiments, a complete analysis of the combustion characteristics of Burundi peat will be undertaken by an internationally known combustion laboratory. The Institute of Gas Technology (U.S.), the Finnish State Laboratories and Bord na Mona have been recommended as potential suppliers of the necessary peat analysis expertise.

4. A redefined pricing strategy for peat developed which is responsive to market behavior

When the project was originally designed, the competitive position of peat vis-a-vis wood and charcoal was considered the most important element of a pricing policy. A 10% price differential in favor of peat was targeted for the domestic market. It was assumed that wood and charcoal prices would continue to rise as availability decreased, while peat prices would actually decrease with economies of scale from increased production and sales. Wood and charcoal prices have in fact not substantially increased, and, as a result, peat has remained more expensive than either wood or charcoal. A revised pricing strategy is therefore required.

With the continuing assistance of the Marketing Advisor, ONATOUR will develop a pricing strategy based on four conditions:

- the price of charcoal and wood must be increased to more justly reflect the replacement costs of wood (i.e. reforestation);
- peat sales volume must be significantly increased, thereby reducing operational costs through economies of scale;
- the sale price of peat must be lowered to give peat a more competitive advantage vis-a-vis alternative fuels; and
- potentially large users of peat should be offered additional incentives to shift to peat use. Long-term contractual arrangements should be negotiated whereby ONATOUR agrees to supply up to a maximum quantity of peat for a fixed amount of revenue. The fixed revenue can be derived from calculating the cost of the fuel presently used by the potential client.

In this manner, ONATOUR can significantly increase sales volume while the new client is supplied with peat at a cost equal to his existing energy budget allocation.

Pricing incentives alone have proven insufficient for the majority of potential peat users to convert to peat. A competitive pricing policy must therefore be supported by additional indirect incentives, including technical and construction assistance in converting existing boilers, kilns, ovens and stoves (see 3. above); design expertise in the construction of new peat-fired stoves (see 3. above); the provision of adequate client peat storage facilities and quality control; reliable peat delivery (see 5. below); packaging that can be easily handled at low labor cost; promotional peat for combustion trials (see 3. above); and active support from local authorities.

The revised project budget provides ONATOUR with the technical and material/commodity funds to deliver these essential marketing incentives within the framework of a pricing strategy.

5. ONATOUR's peat transport services capability strengthened as an important incentive to purchase peat

In the original design of the project, it was foreseen that peat sales would occur at the bog sites and that the client would then be responsible for transporting his purchase to the point of use. It was further assumed that, as the marketing/transport system for wood and charcoal slowly deteriorated due to the unavailability of wood, peat would replace wood in the wholesale/retail distribution network. Wood and charcoal, however, remain available with high market demand. Peat, on the other hand, is presently less accessible and in little market demand. There is no real incentive for the existing wood/charcoal distribution network to accept peat.

Competitive market profiles indicate that at the wholesale level, 75% of the cost of wood to the client reflects transport cost. On the retail level, the cost of wood is only 10% of the price paid by the consumer, with transport and middleman profits accounting for 20% and 60% respectively of the price paid. Assuming that appropriate incentives could be found to entice the distribution networks to market peat, it is certain that the market could not bear the add-on transport costs and profit margins presently associated with the wood/charcoal trade. Peat would be prohibitively too expensive for any potential users.

Faced with the economic reality that a parallel distribution network had to be established for peat, ONATOUR entered into contracts with commercial transporters. Transport rates were negotiated from bog site to the Bujumbura storage facilities. Clients were then required to purchase peat from this central facility and arrange transport from that point. After one year of operation, the weaknesses in this commercial transport network were obvious:

- irregular service (transport from bog site to Bujumbura became irregular, especially during the coffee harvesting season when demand for transport is high);

- continual negotiation with transporters;
- substantial transport loss (transporters showed little concern for prompt delivery, cautious handling and protection of the peat from rain);
- difficulties in assuring delivery to clients in the interior of the country (ONATOUR's sales expansion occurred primarily in the interior and private transporters were reluctant to serve these areas); and
- losses due to excessive handling and high labor cost (the loading of trucks at the bog site, transport to Bujumbura, off-loading at the Bujumbura storage facility, storage, loading on the client's transport vehicles, transport to the client and final off-loading of the peat led to severe handling losses and heavy labor costs).

Using a ten-ton truck purchased in 1978 under the Peat I project, an ONATOUR-purchased seven-ton truck and a pick-up truck, ONATOUR gradually started to build its own transport fleet. In May 1982 a ten-ton truck was purchased with project funds. A year later, two additional ten-ton trucks were purchased, which effectively increased ONATOUR's fleet to five heavy duty peat transport vehicles.

An analysis of transport costs following one year of operation indicated that the cost of ONATOUR-owned transport was approximately FBu 12.2 per ton/kilometer. This figure compared to an "official" transport rate of FBu 22 per ton/kilometer. Negotiated rates with private transporters during the same period ranged from FBu 11 to FBu 19 per ton/kilometer. During the peak of the coffee season, it was extremely difficult to procure transport regardless of price. In February 1984, ONATOUR purchased a four-ton truck to assure transport to small-volume clients in the vicinity of Bujumbura, and a project-funded pick-up now completes ONATOUR's peat transport fleet.

ONATOUR now relies totally on its own trucks for the transport of peat. In addition to the direct savings in transport costs, there are several additional, equally important benefits from ONATOUR's management of its own fleet. Supply schedules now assure prompt and efficient deliveries. Direct delivery translates into reduced mileage, less handling and storage losses, lower storage costs and significant savings in labor costs. The customer, in turn, receives a higher quality product, delivered from the bog site on demand. Problems of high moisture content, breakage and volume of peat dust have likewise largely been eliminated.

In response to the growth of ONATOUR's owned and operated transport service, technical support has been expanded to include truck maintenance and repair. Bog mechanics are now trained by the BMA technicians in the repair and maintenance of both bog machinery and trucks. Project funds will be provided to expand ONATOUR's truck fleet in 1985 by two trucks with trailers, or by a total load capacity of 40 tons. One truck will replace the Peat I-financed truck, and the second truck will assure transport service to the expanding northern markets.

6. Peat bogs in production on a commercial basis

By 1986 four peat bogs - Gisozi, Matana and Gitanga in the southern highlands and Nyamuswaga in the northern highlands - will be in production.

The combined production capacity of the bogs is estimated to be 25,000 MT per year by the end of the project in March 1987. With added equipment inputs, it is also estimated that the four bogs will have a potential for expansion to 50,000 MT per year. Peat production on the southern bogs has been continuing for three years, and technical questions have largely been resolved. Continued production, barring exogenous factors, should be routine.

Major technical efforts will be concentrated on the Nyamuwaga bog. In 1985 field work will continue to assess the effect of drainage on papyrus-covered areas of the bog and to continue investigating the feasibility of integrating peat and agricultural production. Activities will include: (a) widening and deepening the existing main drainage channel for a distance of 480 meters; (b) installation of additional perimeter and field drains; (c) clearing papyrus and other vegetation from the bog and levelling the surface (comparing manual and mechanical levelling in the process); (d) undertaking peat production trials on these areas which were under rice cultivation in 1984; (e) planting up to an additional 62 hectares in rice during the 1985-86 wet season; and (f) undertaking other minor works, including construction of additional benchmarks, installation of extra water measurement gauges, improved access to the bog site and construction of facilities to store the test peat production.

To assist ONATOUR in developing the Nyamuswaga Valley for peat production, long-term engineering and other technical services provided under the BNM contract will be continued. An agronomist specialized in peat soil analyses and bog reclamation will join this team for one year. BNM has been requested to recruit an experienced candidate. A total of six person-months of short-term specialized services will also be provided in the areas of embankment surveying, dam and embankment construction and water quality evaluation. In FY 1985 commodity inputs will be limited to a small amount of hand tools and local materials required for dam/embankment construction. The location of the Amphidredge, Lilliput, Landini tractor and machinery attachments at other bog sites will also require transport to and from Nyamuswaga. Local costs will therefore include POL, maintenance and repairs for the bog machinery used in the drainage and production trials.

By September 1985, sufficient technical and agricultural data will have been collected to completely analyze and subsequently design a comprehensive drainage scheme for the Nyamuswaga Valley. The estimated completion date for the second, and last, phase of the scheme is June 1986.

The extent to which the drainage scheme is implemented on a partial scale prior to the completion of the project will depend largely upon the market demand for peat. If northern markets grow as projected, the technical obstacles to conversion are overcome and a test boiler is installed at COTEBU (cotton factory), then a production target of approximately 5,000 MT can be anticipated in 1986. The FY 1986 project budget provides for the procurement of sufficient additional peat production equipment for the Nyamuswaga bog to ensure that this target demand can be met. Supplementary purchases of production equipment will depend significantly on the growth of the total peat market in Burundi.

7. Reclamation efforts proceeding

Bog reclamation activities will be focused on rehabilitation of the Kivogero bog, post-production reclamation of the Ijenda bog and integrated peat-agricultural production on the Nyamuswaga bog (see 6. above). In April 1979 the Kivogero bog, which had been previously exploited by ONATOUR, was severely damaged following unusually heavy rainfall. Large sections of the bog were washed downstream over a distance of 1.5 km. Although the cause of this disaster was geological, ONATOUR continues to be held at least partially responsible. Both to reinforce its credibility and to test future larger-scale bog reclamation activities, ONATOUR will reclaim this bog in two phases: an analytical phase and a revegetation phase. In the analytical phase, a topographical survey of the bog will be conducted and then followed by hydrological and geotechnical data collection. Based on an analysis of the survey and the data, a detailed plan, based on sound agricultural and hydrological management, for the levelling of the bog will be developed. After levelling, the former bog area will remain fallow to permit the recolonization of natural vegetation. Following the fallow period, leguminous cultures will be tested in collaboration with communal authorities.

Ijenda was one of the first bogs to be exploited for peat by ONATOUR. To date a total of 7,503 MT of peat has been extracted. In light of the depth of the peat remaining, the relatively poor quality of the peat and the high cost of production on the bog, ONATOUR has decided to progressively close this bog to further peat production. Reclamation activities will initially be conducted on a one hectare plot. Trials will be conducted to identify the most suitable crops for post-peat production conditions. The effects of various applications of manure, lime and chemical fertilizers on a variety of local crops and plants will also be tested.

As discussed in Section 6. above, the project will finance the services of an agronomist specialized in peat soil analyses and bog reclamation for one year. Additional project-financed inputs will include 1-2 person-months of technical services for specific problem-solving and the procurement of laboratory and soil testing equipment to strengthen ONATOUR's in-house analytical capability, a utility vehicle, agricultural tools, fencing, seeds, fertilizers, POL and some local labor. Four months of training in peat analysis and bog reclamation will also be provided at the AN FORAS Institute (for bog reclamation) in Ireland.

III. SUPPLEMENTARY PROJECT ANALYSES

Supplementary analyses were completed within the context of the 1984 formative evaluation. They are available for review in GAR/B and ONATOUR. Copies are also available in REDSO/ESA (Nairobi) and AFR/Washington. Supplementary analyses on technical, economic, administrative and environmental considerations are judged to be the most relevant for the project amendment.

A. Supplementary Technical Analysis

A wide variety of technology is available for sod peat production. The simplest method is to handcut raw peat into bricks with a shovel (slean) and air-dry them. The next more sophisticated technology involves maceration (wetting and mixing) and compaction to improve the cohesiveness and density

of the sods. The simplest maceration requires a shovel, hoe or foot. After it has been macerated, the peat is placed in molds and air-dried. Mechanical maceration is also possible, with the technology ranging from bicycle-powered to semi-automatic (engine-powered) machines to fully automatic machines. Bicycle- and semi-automatic maceration require that the peat be hand-cut and then loaded into a hopper which feeds the macerating unit. The peat is discharged on a conveyor belt, cut into sods and spread by hand for drying. Automatic machinery involves various levels of complexity of machine-cutting, -feeding and -spreading for drying. Peat can also be milled, compacted by hydraulic press and dried into briquettes at a processing plant.

The Peat I project experimented with the simplest peat technologies: hand-cutting, hand maceration using sod molds and bicycle-powered maceration. Unfortunately, the sods produced with these technologies broke easily which, in turn, resulted in high transport losses. Furthermore, the large pits which resulted from hand-cutting presented drainage and ecological problems. Following this experience, the technological alternative with the smallest unit of mechanical maceration - semi-automatic machinery - was selected for peat production under this project.

Semi-automatic machinery was selected because of the limited surface areas and shapes of Burundi's bogs, the length of the production season (averaging 100-120 days), the level of mechanical skills of ONATOUR's employees and the desire to stimulate rural employment. It was also recognized, however, that machinery design modifications might be required to handle the relatively high percentage of undecomposed fibrous material in Burundi peat. The machine was expected to produce approximately 920 MT of dried peat per production season.

The semi-automatic machines (SAMs) were introduced on the Ijenda, Gisozi and Matana bogs toward the end of the 1981 production season. It was not until the 1982 production season, therefore, that ONATOUR could evaluate the performance of this technology. The technology was generally well-suited to Burundi's bog conditions, and only minor technical design modifications had been required. The SAM, however, did have difficulty in macerating the particularly fibrous peat of the Gisozi bog. Production outputs compared favorably with the estimate of 920 MT. In the first two years of operation, production averaged 12-16 MT per day using 400 man-hours of labor. Production costs were estimated at FBu 316 per metric ton.

Meanwhile, technological advances in peat production were being introduced in Europe and notably in Ireland. The BNM technicians observed the operation of a new, fully automatic macerating machine, the Difco Cutter, and were very optimistic regarding its suitability for Burundi. The Difco resembles a large chain saw which is pulled behind a tractor. The blade and chain descend vertically into the ground to a depth of 80cm. and, as the unit is pulled forward by the tractor, the chain rotates, picking up peat on its small teeth (10cm²). The peat is then macerated and extruded through several spouts, leaving sausage-like rows of peat on the bog surface. The narrow vertical slice in the bog made by the chain closes with the pressure exerted by the weight of the tractor on a subsequent pass. It was estimated that the output of the Difco would be nearly 60 MT per day and that it could

be operated at a lower cost per metric ton than the SAM. ONATOUR therefore ordered two Difcos and tractors for experimentation during the 1982 production season.

It is very important to note that, during 1981-1983, peat was facing difficult competition from both wood and charcoal. As discussed above in earlier sections, the price of wood had not rapidly increased as anticipated. In order to become price-competitive and still meet its operating costs, ONATOUR sought to reduce production costs. Analyses indicated that bog labor for cutting, spreading, turning, footing (stacking), storing and loading peat was by far the highest production cost, requiring approximately 120,000 man-days per season. Off-season bog-site labor costs were also high. The SAM cut the bog with swaths of 50cm. which then required levelling. Drains had to be dug and repaired, and peat had to be removed from the bog surface and stored. These tasks were being performed manually.

A comparison of the SAMs and the Difcos indicated that the Difco could produce a higher quality sod with minimum labor. The Difco-produced sod was superior in its density, cohesiveness and lower water content. The sausage-like shape also dried faster and more evenly and thus resulted in less breakage and loss. The high fiber content of the Gisdzi bog presented no difficulty for the Difco. Production per hectare significantly increased, from 60 MT with the SAM to 90 MT, as the Difco made possible a greater density of peat which could be dried per surface area. The mobility of the Difco with the tractor also permitted seven crops/cuts per season compared to four using the SAM. Difco production averaged 50-60 MT per day; SAM production averaged 12-20 MT per day.

Difcos are also judged superior to other peat technologies from an ecological standpoint. The Difco eliminates the trench-like effect on the bog surface which is left by hand and semi-automatic extraction, thereby significantly reducing the possibility of bog erosion during the rainy seasons. The Difco reduces wind erosion because the surface soil is left nearly intact. By removing only a narrow vertical section of the bog at a time, the bog retains its natural composition in relatively equal proportions. Vegetation therefore quickly covers the bog following production, restoring the micro-climate of the valley. Difco cutting also allows the bog surface to be gradually lowered as uniformly as possible. Water levels are thereby more easily controlled, and the possibility of high-slides is minimized.

Following the 1982 production season, mechanic training programs were expanded to include instruction on the maintenance and repair of SAMs, Difcos and tractors. ONATOUR mechanics were enthusiastic at the prospect of the new challenge.

The peat market expanded in 1983, especially sales to the armed forces. Clients were increasingly concerned, however, about the quality of the peat and refused to purchase peat which had been produced by hand and by the SAM at the Ijenda bog. ONATOUR also made the policy decision to rely solely upon its own truck fleet for peat transport, delivering peat directly from the bog site to the client's door. Again, this was a cost-saving measure to gain a competitive advantage in the fuel market (see also Section II.C.5 above). Direct delivery meant that the client, rather than ONATOUR, absorbed all costs related to breakage, loss and the expense of removing peat dust from ONATOUR's storage facilities. Sod quality thus assumed increased importance.

ONATOUR's operating costs, however, remained a nagging problem. Expressing reluctance to subsidize parastatal agencies over the long term, the GRB strongly urged all agencies to take immediate measures to insure their financial self-sufficiency.

Also in 1983, ONATOUR significantly increased its production capacity by procuring three additional Difcos and two tractors with project funds. As an extremely valuable supplement to the Difco, however, the SAM technology was not abandoned. Areas of the Matana and Ijenda bogs contain timber, which makes the use of the Difco often hazardous. The Difco and tractor are also unable to cut sufficiently close to outer drains, leaving a small ridge of uncut peat. SAMs will level this area particularly well. SAMs are also particularly well suited for harvesting the outer perimeters of a bog where peat depth varies greatly. During the 1983 production season ONATOUR consequently continued to employ large numbers of day laborers (about 1,200) for turning, footing, removing, storing and loading peat.

Formal and on-the-job training of ONATOUR mechanics continued during 1983 and 1984 under the guidance of the BNM technicians. A general store of spare parts was established, and two additional Difcos and tractors were ordered and arrived in time for the 1984 production season.

The use of tractors and an in-house capability to maintain and repair them presented ONATOUR with additional cost-savings options. If fitted with the necessary attachments, the tractors can also be employed in bog drainage and levelling as well as in removing peat sods from the bog. This not only limits the demand for manual labor but also increases the return on the investment in the tractors. For trial purposes, ONATOUR therefore decided to purchase tractor attachments: one ditcher, one screw-leveler, one bog harvester and two peat trailers. Both the ditcher and the screw-leveler were tested late in 1984; they are extremely well-suited for Burundi's bog surfaces. The bog harvester and bog trailer will be tested together. Delivery of the bog trailers is pending. As a stationary unit, however, the bog harvester is being used successfully to load trucks at the storage hangars.

ONATOUR anticipates that this equipment, in conjunction with the Difco and SAM machinery, will significantly reduce losses due to manual handling of the peat sods. Production per hectare and per man-hour will be substantially increased, and production costs per metric ton will decrease. The tractors also provide greater equipment mobility and ease of movement between bog sites. The continued use of the SAM assures production versatility necessitated by variations in bog characteristics. The SAM-Difco-tractor attachment combination also responds very appropriately to important ecological concerns. At the same time, daily workers will continue to play an important role in bog maintenance, hangar construction, access-road maintenance, etc. However, ONATOUR is now more equitably balancing the desire to stimulate rural employment, the need to lower production costs, and the necessity to insure the delivery of a quality product to clients.

ONATOUR estimates present production capacity on the Ijenda, Matana, Gisozi and Gitanga bogs at ± 25,000 MT per year using the on-site inventory of machinery and bog equipment. Two harvesters and one bog trailer will be procured in 1985 with project funds. No additional substantial equipment procurement will be required for the southern bogs during the remaining two

years of the project. The project budget does, however, include funds to purchase two Dificos and tractors, one harvester and two bog trailers for production on the Nyamuswaga bog. Although planned for 1986, this procurement is contingent upon both the results of the pilot production tests to be conducted in 1985 and the growth of the market for peat in the northern region of Burundi.

B. Summary of a Supplementary Economic Analysis

A supplementary economic analysis, undertaken as a component of the 1984 formative evaluation, is attached as Annex D. An "overall economic appraisal," drawn from that analysis, is included as a summary below.

ONATOUR is currently producing much more peat than it can sell and has the capacity to produce more than it is currently producing. Accordingly, while increasing production efficiency is certainly possible, ONATOUR's major problem at the present time is in the area of marketing and sales. Only when peat is sold in the marketplace is value created or savings vis-a-vis alternative energy sources actually achieved.

Given the technical problems of burning peat, competition from inexpensive hydro-electric power and from wood and charcoal, that are currently priced below their replacement cost, it is difficult, if not impossible, to forecast realistically what might be achieved in the way of sales (creation of value) over the next few years. Accordingly, peat's value to Burundi's economy remains largely unknown at the present time.

Certain elements on the cost side remain uncertain as well. Technological problems remain unsolved and conversion costs are unclear as are the marketing costs involved in convincing consumers to switch to peat use. The speed with which ONATOUR can save on costs through improvements in internal efficiency and by becoming independent of external technical assistance is also uncertain. As a result of these problems on the value and cost side, it would be spurious in the extreme to attempt to calculate an Internal Rate of Return (IRR) for the remaining life of the project under the revised project design. It is hoped, however, that many of the answers and insights necessary to the calculation of a reliable IRR will be discovered over the remaining two years of the project because such an IRR will unquestionably be necessary if follow-on assistance is considered. Indeed, much of the effort called for between now and completion of the project in March 1987 will be focused on such issues.

In the absence of a realistic IRR, it still seems advisable to proceed with the amended project over two more years. Substantial resources have already been committed, and a large number of problems have been overcome. Though large elements of ONATOUR's future remain unclear, it seems very likely that these uncertainties can be resolved over another two years of operation provided that efforts and priorities are redirected. Even if ONATOUR's prospects are found not to be bright in the short run with respect to large-scale peat sales, at a minimum ONATOUR should have the capacity to keep peat as an active if small element in Burundi's energy picture. This would be an important contribution as peat is certain to be critically needed at some point in time in the future of Burundi.

C. Supplementary Administrative/Organization Analysis

In its formative years ONATOUR was primarily production-oriented. Emphasis was placed on the development of an appropriate production technology. The function of the Marketing Service was to sell peat, the underlying assumption being that potential consumers would buy a product which was well-made and reasonably priced. Given the highly competitive nature of Burundi's energy market, it is obvious today that the role of marketing must be extended well beyond that of only sales. Marketing must include product (peat) design, pricing, promotion and distribution, as well as the design, development and retrofitting/conversion of stoves, boilers, ovens and kilns for peat use. Consequently, marketing must be fully integrated into all of ONATOUR's activities, while also influencing both short-term and long-range agency policies.

Since early 1984, ONATOUR has accorded higher priority to the Marketing Service. The participation of ONATOUR's Marketing Manager in all production-related meetings has served to introduce marketing concepts at the beginning rather than at the end of the peat production process. ONATOUR's marketing meetings are now held on a weekly basis with expanded participation to include chiefs from the production, finance, administrative and technical services. Responsibility for specific marketing activities has been spread throughout the organization, from the Director General to the bog manager. ONATOUR must now improve the coordination of these activities. An important step in this regard will be increasing the level of responsibility and decision-making assigned to the Marketing Manager.

Within the context of realigned project inputs (Section II.C. above), technical support to ONATOUR in the field of marketing will continue through the completion of the project. The Marketing Advisor will continue to advise top-level ONATOUR management and will assist the Marketing Manager in planning and coordinating all marketing activities. Two equipped and mobile stove conversion teams will be placed under the supervision of the project-financed stove designer and boiler specialist. An experienced brickmaker and builder will be hired with project funds to further develop the artisanal/commercial brick and bakery markets. A vehicle will be purchased and maintained with project funding to support the coordination of marketing activities and logistics.

D. Supplementary Environmental Analysis

The 1984 formative evaluation effort examined project performance with regard to environmental and natural resource impacts and on-going and proposed reclamation efforts. The report of the applied ecologist, "Environmental and Natural Resources Analysis" (Jeffrey Goodson, REDSO/WCA) and the report of the agronomist/reclamation specialist, "Reclamation Evaluations" (Jean Strimbu, Viking Energy Corp) contain in-depth technical analyses and multiple recommendations which are under review by ONATOUR and the technical assistance team. Non-technical conclusions are summarized below.

As a result of bog drainage, ONATOUR's interventions have resulted in greatly expanded reclamation potential over pre-intervention conditions by providing agriculturalists (most importantly local farmers) with land which was previously unusable due to high water levels. It has also been concluded that pressure by local residents in the areas surrounding the bogs to use the land for agriculture and grazing is great. It is highly likely that rapid occupation of the land would spontaneously occur, if permitted, regardless

of any further ONATOUR or other governmental activity. At Nyamuswaga, reclamation of previously unusable bog areas is proceeding at a very cautious, experimental pace. Since initiation of the drainage scheme study, local administrators, other authorities and farmers have observed initial experimental activities, and there appears to be an informal consensus that peat production using a Difco machine does not threaten agricultural production. Conversely, by draining and clearing previously unavailable areas, the exploitation of peat potentially offers an opportunity to increase agricultural production. Experimental drainage-peat production-cropping activities, initiated on a pilot basis in 1984, are not considered to represent a real or potential source of significant adverse hydrological, agricultural, social and other environmental impacts. The applied ecologist recommended that, after the viability and efficacy of integrated peat-agricultural production have been demonstrated, no large-scale bog drainage occur in the Nyamuswaga Valley until a definitive and cost-effective market for the peat is established. At that time, the area of the bog which would be drained should be commensurate with the amount of land needed to satisfy that demand.

Water quality testing was performed during the evaluation at each of the four southern bogs, the Nyamuswaga bog, the Kivogero bog and at other stations. Data on the southern bogs indicate that no significant water quality deterioration is likely to have occurred or likely to occur in the future as a result of peat exploitation. Additional testing is not considered necessary at these bogs unless water quality problems either are suspected or become apparent. Data on the Nyamuswaga bog were collected as baseline information with which to compare future information in case water quality problems are suspected of occurring. Again, no further testing is considered necessary unless problems either are suspected or become apparent or unless significant agricultural production involves applications of fertilizers and other chemical additives.

In general bog management has taken into consideration the potential adverse as well as beneficial impacts on the environment. Reclamation efforts and experimentation with integrated peat-agricultural production represent a positive step that promises to more fully integrate the social and ecological aspects of the environment.

IV. REVISED IMPLEMENTATION PLAN

A. Revised Financial Plan

1. Summary Financial Plan

The following table indicates the total AID contribution and the equivalent contributions of the GRB and the Government of Ireland to the project for the period FY 1980 to FY 1986.

<u>Summary Financial Plan</u>									
(\$000)									
SOURCE	FY 80-84		FY 85		FY 86		TOTAL		GRAND TOTAL
	FX	LC	FX	LC	FX	LC	FX	LC	
AID	3,322	3,484	644	881	236	433	4,202	4,798	9,000
GRB	-	1,525	-	125	-	125	-	1,775	1,775
GOI	1,380	-	45	-	60	-	1,485	-	1,485
TOTAL	\$4,702	\$5,009	\$689	\$1,006	\$296	\$558	\$5,687	\$6,573	\$12,260
	\$9,711		\$1,695		\$854				

The GRB contribution represents most importantly an annual subsidy to ONATOUR equivalent to ONATOUR's operating shortfall. An in-kind contribution is also estimated for the value of the land on which the ONATOUR office building in Bujumbura was constructed and for the value of the ONATOUR central storage facility in Bujumbura and infrastructure already in place at each bog site. The contribution of the Government of Ireland (GOI) represents the value of Bord na Mona's participation in the project: the base salaries of the long-term peat production technical team and related short-term technical services, both long- and short-term participant training in Ireland and home office backstopping. It should also be noted that the total GOI contribution is somewhat underestimated; the GRB has recently requested the GOI/BNM to provide additional scholarship training. The request is presently under favorable consideration.

2. AID Obligation Schedule

Obligations to complete the AID contribution to the project will be provided in FY 1985 and FY 1986. The FY 1985 Operational Year Budget is \$1,525,000. The balance of required funds, \$669,000, will be provided in FY 1986.

AID Obligation Schedule: FY 1985 and FY 1986

(\$000)

<u>Category</u>	<u>FY 1985</u>	<u>FY 1986</u>	<u>TOTAL</u>
Technical Services	569.0	-	569.0
Commodities	99.5	236.0	335.5
Demonstration & Promotion	101.5	50.0	151.5
Training	(14.0) ^{1/}	-	(14.0) ^{1/}
Construction	(47.0) ^{1/}	-	(47.0) ^{1/}
Nyamuswaga Developmt.	139.7	-	139.7
Other Project Costs	421.0	383.0	804.0
Reclamation	55.3	-	55.3
Project Support Unit	200.0	-	200.0
TOTAL	\$1,525.0	\$669.0	\$2,194.0

^{1/} Represents the reallocation/reprogramming of previously obligated funds.

NOTE: All figures include inflation and contingency.

The detailed project budget for FY 1985 and FY 1986 is attached as Annex E. The detailed project budget also indicates cumulative obligations from FY 1980 to FY 1984.

The 1984 formative evaluation recommended to OAR/B that the marketing and financial advisors be relieved of administrative tasks which should more appropriately be the responsibility of either AID or ONATOUR. Recognizing that neither AID nor ONATOUR are staffed to handle all the administrative and logistic support requirements of a 7-member technical assistance team, the

evaluation more specifically recommended the establishment of a Project Support Unit (PSU), which was already under discussion in OAR/B. The PSU will relieve the two advisors of almost all administrative tasks. OAR/B is now setting up the PSU to provide support for all AID-funded contractors, to be proportionally funded from several projects in the OAR/B portfolio. That portion which will be funded under this project is estimated to cost \$200,000 over the remaining two years of the project.

B. Procurement Plan

1. Technical Services

During the remaining two years of the project, technical services will be required in marketing, finance, peat production, stove design, bog reclamation and engineering. The marketing and finance advisors are already on board under PSCs, and it is expected that the incumbents will continue to provide their services to the project. Extending their contracts will require a special delegation of authority from AID/W because the extensions will increase the contract amounts beyond OAR/B's contracting authority.

The peat production, bog reclamation, hydrological engineering and possibly industrial engineering (boiler design) expertise will be provided under the terms of the present host country contract with BNM. OAR/B will collaborate with ONATOUR and BNM staff to prepare an amendment to the contract, extending the effective period of the contract through the completion of the project and adjusting personnel requirements in accordance with this project amendment and the recommendations of the 1984 formative evaluation. REDSO/ESA concurrence will be required.

A stove designer entered on duty in March 1985 under a PSC. Any extension of his contract will be within OAR/B's contracting authority.

OAR/B will procure consultancy services either through PSCs or under the terms of the BNM contract.

2. Commodities

Major commodity procurement under the project has been completed and remaining procurement is necessary only to fill in gaps. Types of equipment will be similar to those already purchased and fall into three primary categories: peat production and handling equipment, materials for stoves and stove conversions, and vehicles. Virtually all peat equipment has its source and origin in Ireland and requires procurement waivers. OAR/B will prepare waivers for REDSO/ESA concurrence and will then prepare PIO/Cs and contract directly with suppliers.

Stove materials are available either locally or in Kenya. OAR/B will contract directly with the suppliers, with perhaps some assistance from the REDSO/ESA Regional Supply Management Officer in contacting Kenyan firms.

All vehicles purchased under the project have been, and will continue to be, of AID Geographic Code 935 origin, with Burundi as the source.

OAR/B will prepare waivers for REDSO/ESA concurrence and will contract directly with local suppliers for purchase and delivery.

C. Implementation Schedule

The following schedule presents the major documentation requirements and implementation actions which have been completed since October 1984 and which will be undertaken through the completion of the project in March 1987.

<u>Date</u>	<u>Action</u>	<u>Responsibility</u>
1984 November - March 1985	Equipment and spare parts for 1985 production season ordered	ONATOUR-OAR/B
December 1985	Stove Designer recruited	OAR/B
January-March February	Training program for mechanics Contract for up-country construction signed	ONATOUR-BNM ONATOUR-OAR/B
March	Marketing Advisor's contract amended to extend period of services	OAR/B
March	Stove Designer arrives	OAR/B
March	Data collected for the competitive energy profile.	ONATOUR
March	First phase of Nyamuswaga development study completed	ONATOUR-BNM
March - April	Boiler specialist (industrial engineer) recruited	OAR/B-BNM
March - May	Agronomist/bog reclamation specialist recruited	OAR/B
April	PP amendment authorized	OAR/B-REDSO/ESA
April	Contract signed for workyard construction	ONATOUR-OAR/B
April	Brickmaking team locally recruited and hired	ONATOUR-OAR/B
April	First stove conversion team starts to work	ONATOUR
April	Construction trials started on model peat-burning bakery ovens and institutional stoves	ONATOUR
April	Peat analyses arranged	OAR/B-ONATOUR
April-May	Project Grant Agreement amendment signed	OAR/B-GRB
May	BNM contract amended to extend	GRB-BNM-OAR/B
May	Participation in the Energy Fair	ONATOUR-OAR/B
May - September	1985 peat production season	ONATOUR
July	Second stove conversion team starts work	ONATOUR
August	Prototype domestic stove under testing	ONATOUR
August-September	Audit of ONATOUR's 1984 financial accounts	OAR/B-ONATOUR

October - December	Equipment and spare parts for 1986 production season ordered	ONATOUR-OAR/B
October-March 86	Training program for mechanics	ONATOUR-BNM
December	Nyamaswaga pilot bog drainage completed	ONATOUR-BNM

1986

March	Up-country construction completed	ONATOUR-OAR/B-REDSO/ESA
April	Workyard construction completed	ONATOUR-OAR/B-REDSO/ESA
May - September	1986 peat production season	ONATOUR
June	Nyamaswaga development study completed	ONATOUR-BNM
August - September	Audit of ONATOUR's 1985 financial accounts	OAR/B-ONATOUR
September - December	Final/summative project evaluation	OAR/B-ONATOUR

1987

March	Project Assistance Completion Date	GRB-OAR/B
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D. Evaluation Plan

The final evaluation of the project will be scheduled between September and December 1986. The purpose of the evaluation will be to determine the impact which peat has had on Burundi's fuel market and to examine ONATOUR's capacity to respond to consumer requirements, both in the production of peat and its marketing to the full range of potential clients. The specific terms of reference for the evaluation will be agreed upon jointly by OAR/B and ONATOUR. The evaluation will be collaboratively undertaken with participation by ONATOUR, the Government of Ireland (BNM and the GOI Department of Foreign Affairs), OAR/B and REDSO/ESA. The evaluation team will include expertise in marketing, peat production, engineering, economics and alternative energy. Up to three weeks will be required to perform the evaluation, including a document review, interviews, site visits and preparation of the report.

E. Project Authorization and Project Grant Agreement

The conditions precedent included in the original Project Authorization and Project Grant Agreement have all been satisfied. No new or additional conditions precedent are called for within the context of the amended project. The original Project Grant Agreement (dated August 29, 1980) includes thirteen covenants of which four relating to project evaluation, counterparts and senior personnel, publicity, and vehicles and equipment have been fulfilled. A covenant relating to housing at the bog sites has been eliminated. The remaining covenants relating to transportation of project-financed commodities, the on-site sales price for peat, long-term uses of the peat bogs, compensation for the allocation of land for peat production,

hiring of local labor, audit, coverage of ONATOUR's operating shortfalls and tax exoneration for ONATOUR will remain in force through the completion of the project. No new or additional covenants are called for within the context of the amended project.

The Project Authorization for this amendment to the project will include provisions relating to the increase in life-of-project funding and to the extensions of the Project Assistance Completion Date from March 31, 1986 to March 31, 1987.

Following authorization of the project, the Project Grant Agreement will be amended to obligate the FY 1985 funds for the project. The Amplified Project Description, Annex 1, will also be revised to reflect the amended description and revised financial plan for the project. No difficulties in negotiating the Grant Agreement amendment are anticipated.

BURUNDI: PEAT II PROJECT

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.

Life of Project From FY 1980 to FY 1986
Total U.S. Funding \$9,000,000
Date Prepared 4/85 PAGE 1

FOR OFFICE USE ONLY

Project Title & Number BURUNDI PEAT II PROJECT (695-0103)

PROGRAM OR SECTOR GOAL	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or sector goal: The broader objective to which this project contributes(A-1)	Measure of Goal Achievements (A-2)	(A-3)	Assumption for achieving goal targets (A-4)

To maximize the effective utilization of Burundi's limited energy resources.

Increased use of peat as an alternative form of energy.

Peat production and sales statistics.

GRB remains committed to encouraging the use of peat as an alternative to wood, charcoal and fuel oil.

BURUNDI: PEAT II PROJECT

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

INSTRUCTIONS: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IF USED, IT SHOULD NOT BE RETAINED OR SUBMITTED.

Life of Project From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared _____

Project Title & Number BURUNDI PEAT II PROJECT (695-0103)

PROJECT PURPOSE	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose (D-1)	Conditions that will indicate purpose has been achieved End-of-Project Status(B-2)	(B-3)	Assumptions for achieving purposes (B-4)

To strengthen ONATOUR's capacity to produce and aggressively market peat as an alternative fuel, considering all possible markets but initially concentrating on those in which peat is most cost-competitive.

ONATOUR fully functional with trained managerial and technical staff.

An effective, aggressive peat marketing strategy developed and an initial campaign launched.

Peat production and reclamation efforts continuing smoothly.

Analysis of ONATOUR's production and marketing records.

The use of peat proves acceptable to both commercial and domestic consumers.

The combustion properties of Burundi's peat will prove to be of sufficient quality to make it an economical fuel alternative in all potential market segments.

Revenues from peat sales will cover ONATOUR's operating costs.

BURUNDI: PEAT II PROJECT

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO DETERMINING DATA FOR THE PAR REPORT. IT NEED NOT BE OBTAINED OR SUBMITTED.

Life of Project _____
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared _____

AND 1000-10-10-10
SUPPLEMENT 1

Project Title & Number BURUNDI PEAT II PROJECT (695-0103)

OBJECTIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs (C-1)	Magnitude of Outputs (C-2)	C-3)	Assumption for achieving output

- | | | | |
|--|---|--|---|
| 1. On-the-job and third country training provided to ONATOUR's managerial and technical staff. | 1. The following ONATOUR personnel trained
2 marketing specialists
2 financial managers/analysts
5 bog managers

8 mechanics
2 laboratory technicians
1 general engineer
2 stove conversion teams | Analysis of ONATOUR records and project evaluations.

ONATOUR, AID-OAR/B and GRB training records. | 1. The GRB provides adequate budget support until ONATOUR becomes self-supporting.

2. ONATOUR hires and makes available appropriate personnel for project implementation and training.

3. Public acceptance and use of ONATOUR-designed and -tested stoves, boilers, ovens and kilns.

4. Consumer acceptance of peat as an alternative to wood, charcoal and fuel oil as an energy source.

5. Appropriate combinations of labor-intensive and machine-intensive practices are feasible.

6. Local authorities cooperate with reclamation efforts. |
| 2. Continued development of a marketing information system. | 2. A marketing information system in use with product, market, competitive energy, facility and cost profiles. | | |
| 3. ONATOUR's in-house capability to design and convert stoves, boilers, ovens and kilns for peat use strengthened. | 3. X-number of stoves, boilers, ovens and kilns designed and/or converted to peat use. | ONATOUR records and evaluations.

Plant inspections and evaluations. | |
| 4. A redefined pricing strategy for peat developed which is responsive to marketing behavior. | 4. A pricing strategy, including provision of indirect incentives to encourage peat consumption, developed. | ONATOUR records and reports. | |
| 5. ONATOUR's peat transport capability strengthened as an important incentive to purchase peat. | 5. A reliable distribution system, with sufficient vehicles, in operation to serve market demand. | ONATOUR records. | |
| 6. Peat bogs in production on a commercial basis. | 6. Four bogs in production by 1986, with a production capacity of 25,000 MT per year by the end of the project and with potential for expansion to 50,000 MT per year with added equipment inputs. | ONATOUR records. | |

BURUNDI: PEAT II PROJECT

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PDS REPORT. IT NEED NOT BE RETURNED OR SUBMITTED.

Life of Project _____
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared _____

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Project Title & Number: BURUNDI PEAT II PROJECT (695-0103)

OBJECTIVE CATEGORY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs(C-1)	Magnitude of Outputs(C-2)	C-3	Assumption for achieving outputs

7. Reclamation efforts proceeding.

7. Reclamation and rehabilitation of two bogs (Kivogero and Ijenda).

BURUNDI: PEAT II PROJECT

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared _____

DD FORM 10-78
PROJECT DESIGN SUMMARY

INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.

Project Title & Number: BURUNDI PEAT II PROJECT (695-0103)

PAGE 1

OBJECTIVE CATEGORY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs(D-1)	Implementation target (Type and Quantity(D-2))	(D-3)	Assumptions for providing inputs (D-4)

AID FY 80 - FY 86
TECHNICAL SERVICES (\$000)

Project Grant Agreements, financial records, evaluations

Long-Term
Marketing Advisor (2/81-3/87) 410
Admin./Financial Advisor (5/82-) 517
Stove Designer (3/85-9/86) 126
Bord na Mona Contract (8/81-3/87) 1,077
Short-Term
Gasification (1 pm) 39
Ag. Peat Specialist (45 days) 15
Water Evaluation (1 pm) 10
Other services 112
Sub-Total 2,336

COMMODITIES
Conversion equipment 115
Peat production equipment 1,300
Lab equipment 26
Misc. equipment 531.9
Vehicles 687.8
Sub-Total 2,660.7

DEMONSTRATION/CONVERSION
Skilled labor (3 teams) 76
Construction materials 133
Publicity costs 74.2
Peat analyses/tests 22.5
Sub-Total 305.7

TRAINING, short-term, third country 95.3

CONSTRUCTION
ONATOUR office 418
Up-country housing & offices 238

GOVERNMENT OF BURUNDI
Subsidy to cover ONATOUR's operating shortfall 8/80-7/84 \$1,105,525
1985 request 125,000
Estimated 1986 request 125,000
Sub-Total 1,355,525
In-kind (land & infra-structure) 419,475
GRAND TOTAL \$1,775,000

GOVERNMENT OF IRELAND
Long- and short-term technical services, participant training & home office backstopping (through the Bord na Mona contract) \$1,485,000

BURUNDI: PEAT II PROJECT

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

INSTRUCTIONS: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETURNED OR SUBMITTED.

Life of Project _____
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared _____

Project Title & Number: BURUNDI PEAT II PROJECT (695-0103)

OBJECTIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Project Inputs (D-1)	Implementation target (Type and Quantity (D-2))	(D-3)	Assumptions for providing inputs (D-4)

ONATOUR hangar	245
Bog site hangars & workshops	165
Sub-Total	<u>1,066</u>

NYAMUSWAGA DEVELOPMENT

Construction	27
Tools and equipment	1
Soil analyses	8.5
Equipment O&M	78.2
Local labor	125
Sub-Total	<u>239.7</u>

OTHER PROJECT COSTS

Contractor housing rentals	725.8
Office support	103
Vehicle O&M	695.7
Administration/local staff	466.8
Sub-Total	<u>1,991.3</u>

RECLAMATION

Peat analyses	15
Local labor	50
Farm equipment & supplies	18
Misc. expanses	22.3
Sub-Total	<u>105.3</u>

<u>PROJECT SUPPORT STAFF</u>	200
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GRAND TOTAL \$9,000.0

36

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5C(2) PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only:
 B.1. applies to all projects funded with Development Assistance loans, and
 B.3. applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT? Yes.

A. GENERAL CRITERIA FOR PROJECT1. FY 1985 Continuing Resolution Sec. 525; FAA Sec. 634A; Sec. 653(B).

(a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or nor more than \$1 million over that amount)?

(a) CN was submitted to Congress on 11 March, 1985 and the waiting period has expired without objection.

(b) Yes; funds budgeted for FY 1985 represent the Operational Year Budget for the project.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

(a) Yes; see the amendment to the Project Paper.

(b) Yes; the amendment to the Project Paper includes a detailed revised project budget.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?
- No legislative action is required.
4. FAA Sec. 611(b); FY 1985 Continuing Resolution Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973, or the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See AID Handbook 3 for new guidelines.)
- Not applicable.
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?
- Not applicable.
6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.
- This project is not susceptible to execution as part of a regional project. The Government of Ireland participates in the project under the terms of a host country contract with the GRB. The GOI provides technical services and participant training through the Irish Peat Board (Bord na Mona).

7. FAA Sec. 601(a). Information and conclusions whether projects will encourage efforts of the country to:
(a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.
8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
9. FAA Sec. 612(b), 636(h); FY 1985 Continuing Resolution Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

(c): The project is assisting the GRB's National Peat Office (ONATOIR) to improve its technical efficiency in exploiting and marketing peat as an alternative source of fuel in Burundi. This represents a new industry and commerce for the country.

A limited amount of the long- and short-term technical services will be procured from private U.S. contractors.

The GRB is contributing the equivalent of \$1,775,000 to the project. The U.S. does not own foreign currencies which can be utilized in lieu of dollars for implementation of the project.

No. The U.S. does not own excess foreign currency of Burundi.

10-

11. FAA Sec. 601(c). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? Yes.
12. FY 1985 Continuing Resolution Sec. 522. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity? Not applicable.
13. FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16. Does the project or program taken into consideration the problem of the destruction of tropical forests? The project has complied with the environmental procedures set forth in AID Regulation 16. No tropical forests will be destroyed.
14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)? Not applicable.

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15. FY 1985 Continuing Resolution Sec. 536. Is disbursement of the assistance conditioned solely on the basis of the policies of any multilateral institution?

No.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

- a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas; and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote

(a) Peat production on the Burundian bogs is utilizing a mix of labor-intensive and mechanized technologies. Local labor is also employed to turn, stack, remove, store and load peat at the bog sites. Up to 1,200 local laborers are employed during the peak of the production season.

(b) Not applicable.

(c) The goal of the project is to assist the GRB in maximizing the effective utilization of Burundi's limited energy resources by developing an underutilized resource - peat. This can be considered a self-help effort on the part of Burundi.

the participation of women in the national economies of developing countries and the improvement of women's status, (e) utilize and encourage regional cooperation by developing countries?

(d) Women will participate in testing and selecting appropriate peat stoves for household use. In general the involvement of women is considered essential to an expanded use of peat.

e) Not applicable.

b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?

Yes; Selected Development Activities.

c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

Yes. The most appropriate technologies for the scale of exploitation and for the bog conditions is being emphasized for peat production in Burundi. The technologies are a mix of labor-intensive and mechanized means.

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed country)?

Burundi is a "relatively least developed" country. A waiver of the cost-sharing requirement was approved by the AA/AFR concurrent with authorization of the project.

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project for more than 2 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country

Not applicable.

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"relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than \$100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character."

- f. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

Yes; the project gives reasonable promise of contributing to the development of a relatively new economic resource (peat), to an increase in Burundi's productive capacities in exploiting its peat reserves and to supporting efforts towards self-sustaining economic growth.

- g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.

The project is aimed at strengthening the capacity of ONATOUR to produce and market peat as a viable alternative fuel to wood, charcoal and fuel oil in particular recognition of the eventual unavailability of these fuels to the people of Burundi. The training of Burundians has effectively developed ONATOUR as a viable institution so that it can now participate effectively in government processes.

2. Development Assistance Project
Criteria (Loans Only)

Not applicable.

- a. FAA Sec. 122(b). Information on conclusion on capacity of the country to repay the loan, at a reasonable rate of interest.
- b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

3. Economic Support Fund Project
Criteria

Not applicable.

- a. FAA Sec. 531(a). Will this assistance promote economic and political stability? To the extent possible, does it reflect the policy directions of FAA Section 102?
- b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?
- c. FAA Sec. 534. Will ESF funds be used to finance the construction of, or the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives?

- d. EM Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?

5C(1) -- COUNTRY CHECKLIST

Listed below are statutory criteria applicable generally to FAA funds, and criteria applicable to individual fund sources: Development Assistance and Economic Support Fund.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 481; FY 1985 No
Continuing Resolution Sec. 528. Has it been determined or certified to the Congress by the President that the government of the recipient country has failed to take adequate measures or steps to prevent narcotic and psychotropic drugs or other controlled substances (as listed in the schedules in section 202 of the Comprehensive Drug Abuse and Prevention Control Act of 1971) which are cultivated, produced or processed illicitly, in whole or in part, in such country or transported through such country, from being sold illegally within the jurisdiction of such country to United States Government personnel or their dependents or from entering the United States unlawfully?

2. FAA Sec. 620(c). If No
 assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) the debt is not denied or contested by such government?

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3. FAA Sec. 620(e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No
4. FAA Sec. 620(a), 620(f), 620(D); FY 1985 Continuing Resolution Sec. 512 and 513. Is recipient country a Communist country? Will assistance be provided to Angola, Cambodia, Cuba, Laos, Syria, Vietnam, Libya, or South Yemen? Will assistance be provided to Afghanistan or Mozambique without a waiver? No
5. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action of U.S. property? No
6. FAA Sec. 620(1). Has the country failed to enter into an agreement with OPIC? No
7. FAA Sec. 620(o); Fishermen's Protective Act of 1967, as amended, Sec. 5. (a) Has the country seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters? a. No
- (b) If so, has any deduction required by the Fishermen's Protective Act been made? b. NA

-3-

8. AA Sec. 620(q); FY 1985
Continuing Resolution Sec.
518. (a) Has the government of the recipient country been in default for more than six months on interest or principal of any AID loan to the country? (b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the appropriation bill (or continuing resolution) appropriates funds?
- a. No
- b. No
9. FAA SEC. 620(s). If contemplated assistance is development loan or from Economic Support Fund, has the Administrator taken into account the amount of foreign exchange or other resources which the country has spent on military equipment? (Reference may be made to the annual "Taking Into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)
- NA
10. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

-4-

11. FAA Sec. 620(u) What is the payment status of the country's U.N. obligations? If the country is in arrears were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? (Reference may be made to the Taking into Consideration memo.) In arrears. - Yes
12. FAA Sec. 620A; FY 1985 Continuing Resolution Sec. 521. Has the country aided or abetted, by granting sanctuary from prosecution to, any individual group which has committed an act of international terrorism? Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed a war crime?
13. FAA Sec. 666. Does the country object, on the basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA?
14. FAA Sec. 669, 670. Has the country, after August 3, 1977, delivered or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards? Has it transferred a nuclear explosive device to a non-nuclear weapon state, or if such a state, either received or detonated a nuclear explosive device? (FAA Sec. 620E permits a special waiver, of Sec. 669 for Pakistan.)

Unknown

15. ISDCA of 1981 Sec. 720. Was the country represented at the Meeting of Ministers of Foreign Affairs and Heads of Delegations of the Non-Aligned Countries to the 36th General Assembly of the U.N. of Sept. 25 and 28, 1981, and failed to disassociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the Taking into Consideration memo.)

15. FY 1985 Continuing Resolution. If assistance is from the population functional account, does the country (or organization) include as part of its population planning programs involuntary abortion?

16. FY 1985 Continuing Resolution Sec. 530. Has the recipient country been determined by the President to have engaged in a consistent pattern of opposition to the foreign policy of the United States?

B. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria

FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy?

2. Economic Support fund
Country Criteria

No

FIA Sec. 502B. Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the country made such significant improvements in its human rights record that furnishing such assistance is in the national interest?

ONATOUR STAFF/EDUCATION LEVELS/TRAINING

NON/No. PERSON	EDUCATION	PROJET TOURBE TRAINING	
		FORMAL (Mths)	INFORMAL ON/JOB
1. Kinigi, Daniel	4 yrs Univ. (Economic)	2 mths (Management)	little
2. Tegizimana, Laurent	4 yrs Univ. (Law)	1 mth (Admin.)	little
3. Sinzinkayo, Léonce	5 yrs Univ. (Mine, Eng.)	1 mth (Admin.)	little
4. open, presently directed by Kinigi and Sinzinkayo			
5. Harambagiye, Balthazar	Sec. School	None	None (new employee)
6. Dkuzimana, Ferdinand	4 yrs Univ. (Economics) 10 mths (finance OCAM)	10 mths (Finance) paid by France	R. Smith
7. open, presently directed by Sinzinkayo			
8. Birahunguye, Juvenal	4 yrs Univ. (Economics)	18 mths Univ. Marketing mths (Admin.)	on-going R. Burke
9. Nikobasa, Charles	5 yrs Univ. (Mine, Eng.)	None	EKONO
10. Bikwenu, Gaspard	4 yrs Univ. (Ecologie)	Peat Congress	G. Loughman
11. Ntebutsi, Leopold (Except personnel)	1 yr. University	None	New position
12. open, Project training Makoko, Charles		-	on-going R. Smith
13. Kamuca, Béatrice	Secondary school	-	-
Mishuts, Valerie	Secondary school	-	-

IMANCY E

Ruvakokoye, Didace	Secondary school	-	-
14. Ndayuwundi, Bonaventure	Secondary school	None	New position
15. Joint Service Function	-	-	-
16. Karangwa, James	5 yrs Univ. (Chem. Eng.)	None	None
17. Bagina, Kazalika	5 yrs Univ. (Mine, Eng.)	None	J. Corcoran
18. Mme Pascasie	Secondary School	None	Some, R. Burke
19. Joint function w/ventes	-	-	-
20. Manirakiza, Stany	3 yrs Univ. (Accountancy)	-	R. Smith (now EKONO)
21. Ntikubuza, Juvénal	6 yrs Univ. (Phd. Geology)	None	None
22. Ndoricimpa, Zacharie	3 yrs Univ. (Accountancy)	None	R. Smith
23. Mme Devange	Secondary School	None	None
24. Joint Service function	-	-	-
25. Joint Service function	-	-	-
26. Bankamwabo, Jean	Topography	None	One year BNM Team
27. Harushamagara, SLkte Full Lab Staff (2)	4 yrs Univ. (Bio/Chem)	None	None
28. Banyiyezako, Léonard	1 yr Univ. (Science)	None	Maher/Corcoran
Ruryomimbwa, Pascal	Secondary Sch.	None	Casey/Corcoran
Mikaza, J. Marie	2 yrs Univ. (Science)	None	Carroll/Corcoran
Vurayudrgabo, Alphonse	Secondary School	None	Casey/Corcoran
29. Mucerengue, Sylvère	Adv. Tech. Trg/Mechanics	3 mths	On-going, BNM Team
Mechanic staff (6)	Tech. Secondary School	3 mths	On-going, BNM Team

30. Mbanzabugabo, Anastase (Salary paid by Project)	2 yrs Univ./Bus. Mktg	None	New employee/Surke
31. Joint Service Function	-	-	-
32. position closed	-	-	-
33. Joint Service Function	-	-	-
34. bog Manager EKONO Technicians	unknown	-	on-going, EKONO Team
35. driver (1)	-	-	-
36. daily laborers (10-15)	-	-	-
37. driver (1)	-	-	-
38. open, Project training Cyemayire-Nzovu Innocent	2 years university	-	Loughman
39. drivers, Buja (8)	-	-	-
40. assists. (5)	-	-	-
41. receptionist (1)	-	-	-
42. messengers (2)	-	-	-
43. guards, Buja (8)	-	-	-
44. assist. bogs (4)	-	-	-
45. mechanics, bogs (4)	Techn. Sec. School	3 months	On-going, BNM team
46. drivers bog equip (5-8)	-	-	On-going, BNM Team
47. foremen bogs (12-18)	-	-	-
48. stores clerks, bogs (4)	-	-	-
49. drivers, bogs (4)	-	-	-
50. guards, bogs (20-30)	-	-	-

assist. mechanics, bogs (4-8)

assist. bog equip. Drivers,
bogs (5)

on-going, BIM Team

on-going, BIM Team

ESSENTLY TRAINING BOARD

Mungoko, André

revious, Marketing Sales Dept..

3 yrs Bus. Admin.
Program - Ireland *

Mibwami, Etienne

previous bog manager

3 yrs Civil Engineering
Program Ireland.

Supplementary Economic AnalysisA. The Economics of Peat in Burundi1. Factors Militating Against its Use

Three factors strongly militate against peat being an economic source of fuel in Burundi at the present time. First, the fuelwood/charcoal "crisis" foreseen in the Project Paper has, for the moment, failed to materialize. This has resulted from increased accessibility and marketing of existing timber - as new roads have been built - and a successful reforestation effort undertaken by the Government of Burundi and the donor community. While this "crisis" must inevitably occur at some point as population and food requirements increase it may be some years in the future in terms of its ability to impact significantly on fuelwood and charcoal prices and thus on the overall viability of peat production. (In fairness, there is considerable controversy over the fuelwood/charcoal situation in Burundi. The crisis may arise much sooner than some expect).

Secondly, Burundi currently imports 90-95 percent of its electricity in the form of low cost hydro-electric power from Zaïre and plans to develop its own considerable hydro-electric potential. As a result, the potential market for peat as a substitute for petroleum in the generation of electricity, steam and heat is limited in Burundi. Some small diesel generating units are in operation around the country which might be replaced with peat fueled plants but the technical and cost aspects of this remain to be investigated. Burundi also imported over 6 million litres of fuel oil - primarily for the brewery and textile factory - in 1983 and considerable savings are possible if these are converted to peat. At 1983 economic production costs ONATOUR could provide the energy equivalent of these fuel oil imports at a saving of over \$660,000 a year at current exchange rates. Over 20 years at 15 percent, such savings have a present value of \$4.1 million, an amount likely to be well in excess of conversion costs.

Thirdly, peat cannot be used by any domestic cook stove, boiler or artisanal furnace traditionally in use in Burundi. Some technical modifications have and will be required in all cases and in the case of cookstoves a modification of cultural attitudes and practices will be required as well. That this whole process is fraught with potential difficulties of currently unknown, but knowable, dimensions is well illustrated by the fact that special peat fueled boilers imported by the European Economic Community for use at the tea factory proved unsuitable for the combustion of Burundi peat - resulting in a considerable setback to ONATOUR's efforts to penetrate the industrial market^{1/}. Accordingly, research, development and marketing costs are likely to be high, raising the economic cost of peat as an energy source to an unknown degree. Certainly the unavailability of adequate technical advice has proven a major constraint to ONATOUR's ability to penetrate the artisanal and domestic market.

2. The Cost of Alternative Fuels

Table I below sets out the best available estimates of the cost of alternative fuels in terms of what it would cost in terms of the expenditure

^{1/} The problem is further complicated by the fact that the ash content and combustion properties of Burundi peat varies within a given bog such that a portion may be suitable in a given boiler design while the remainder is unsuitable

of economic resources to procure the energy equivalent of a ton of peat. (3 million kilocalories) in that form. (The precise calculations behind these costs are set out in appendices A and B). The data was obtained from GRB documents and conversations with Department of Forestry and ONATOUR staff.

Table I

Alternative Fuel Costs-Energy Equivalent of a ton of peat

Peat	FrBu 13,622
Kerosene	FrBu 26,415
Diesel	FrBu 26,928
Fuel Oil	FrBu 17,932
Charcoal	FrBu 7,559
Wood	FrBu 3,446

Several comments on this table are in order. First, the economic costs of kerosene, diesel and fuel oil are understated in that the Burundi Franc is over-valued. The costs given were calculated at an official exchange rate of FrBu 120 = \$1.00 whereas the equilibrium rate is likely between FrBu 145-150 per U.S. dollar. Secondly, the costs for fuelwood and charcoal were calculated on a replacement cost basis for bulk deliveries - in Bujumbura - only. As these products are sold in smaller and smaller units their costs can be expected to be higher by as much as 60-80 percent.

3. Is Peat Competitive in Terms of Economic Cost

Determining ONATOUR's current economic cost of production is difficult as ONATOUR's records are kept for financial purposes as opposed to economic appraisal. Table II below accordingly represents an attempt to convert ONATOUR's 1983 records of financial performance into a form that will provide an estimate of economic production costs. In order to do this, certain 1983 capital expenditures have to be spread out over time and some estimate of the contribution of pre-1983 capital stock to 1983 production has to be made. The methodology for doing this is set forth in the notes to the table.

With total economic costs of FrBu 181 million and a total production of 13,292 tons in 1983, ONATOUR has an economic cost of FrBu 13,622 per ton. Comparing this with the alternative energy costs of Table I it is clear that peat is economically competitive with petroleum based fuels. As has already been noted there appears to be scope for considerable savings by substituting peat for fuel oil used largely by the brewery and the textile industry. An investigation into the conversion costs and technical problems associated with such a substitution (along with an examination of the costs and problems associated with a switch to hydro-electric power) should be undertaken as soon as possible and appropriate decisions taken on the basis of the results. Such a substitution, it should be noted, would provide ONATOUR with a market for over 18 thousand tons of peat per-annum.

The competitiveness of peat with fuelwood and charcoal is more problematic. The costs shown in Table I for these energy sources are bulk costs and the costs paid for these commodities by smaller users are likely to be 60-80 percent higher. Thus, in the case of charcoal at least, ONATOUR might well be able to compete in some markets, particularly if the GRB would act to promote economic prices for charcoal. It is well to remember too that the cost figures for fuelwood and charcoal represent an overall national average. In some areas of the country there are shortages of timber which would, in relation to energy demands, raise the cost of fuelwood and charcoal well above the levels of Table I. A possible example of this sort of situation seems likely to arise in the case of the GRB's efforts to produce heat-cured tobacco in Northern Burundi. Such tobacco requires a very large amount of fuelwood for the curing process but the area that has been chosen is far from an assured fuelwood supply. ONATOUR, if it can plan adequately for the technical problems of peat combustion in curing barn furnaces, may well be able to capture this market to the tune of about 15,000 tons of peat per year. Overall, it seems advisable for ONATOUR not to attempt to compete with fuelwood and charcoal across the board in all markets but rather to seek out those situations where the location of its bogs, and the local fuelwood/charcoal picture, give it a competitive edge. Central to ONATOUR's capacity to do this is an in-house capability to deal with the technical problems of peat combustion in various uses and a marketing and analytical capacity to identify such situations.

While Table II provides what is believed to be a reasonably accurate picture of the value of the economic resources used in 1983 to produce a ton of peat, it is unlikely that the use of such resources has been minimized. ONATOUR is thought to be functioning well below capacity and, if this is the case, a considerable improvement in the economic position of peat vis-a-vis other energy sources may well be possible. Since ONATOUR is already producing well in excess of what it is able to sell, such improvements in efficiency will depend upon its ability to find new markets.

In a very real sense, ONATOUR is caught "between a rock and a hard place". It will find it difficult to compete in the market place at large unless it can use its resources efficiently to attain maximum production - economies and hence the lowest possible price. At the same time it will find this difficult to achieve unless it can rapidly expand its market. Accordingly, a switch by the brewery and textile factory to peat, the capture by ONATOUR of the large market potential of the tobacco industry and possibly the development of agricultural uses for peat are likely to be critical to its success. With good management, an aggressive marketing strategy-coupled with adequate technical support - and GRB support, peat has a reasonably promising economic outlook today. In the absence of same, peat's economic potential will shift to some point in the future when the cost of alternative energy sources rise such as to give peat a greater competitive edge during its infant industry phase. The next year or two of the project will be critical to the ultimate outcome.

4. GRB Policy and Peat

GRB energy policy is unquestionably important to the future of ONATOUR and peat production in Burundi. If the GRB is serious about peat it should continue to give ONATOUR access to the institutional market it controls. It should also support studies of the economics of substituting peat for fuel oil

TABLE II

Peat Production Economic Costs : 1983
(000FrBu)

	Project ^{1/}	ONATOIR	Total
<u>Recurring Costs</u>	<u>57,164</u>	<u>68,221</u>	<u>125,385</u>
Personnel (Technical Assistance)	30,615	-	30,615
Local Salaries		38,781	38,781
Local Personnel Benefits		3,936	3,936
Vehicle Spares	5,099	-	5,099
Fuel and Maintenance		11,808	11,808
Production Equipment Spares	3,550	-	3,550
Office Supply/Support	761	2,861	3,622
Commercial Transport Costs		10,835	10,835
Other Costs	17,139		17,139
<u>Capital Costs Attributable to 1983</u>			
<u>Production</u>	NA	NA	<u>22,670</u>
Office Construction	(1,000 ^{2/})		1,000
Storage Construction - Up-Country	222 ^{3/}	452 ^{3/}	674
Office Equipment and Furniture	8 ^{3/}	8 ^{3/}	16
Housing Equipment and Furniture	91 ^{3/}	5 ^{3/}	96
Vehicles	4,443 ^{4/}		4,443
Production Equipment	768 ^{5/}		768
Other Capital	622 ^{6/}		622
Contribution from Capital Purchased in Prior Years		(15,051 ^{7/})	<u>15,051</u>
<u>Total Cost USAID/ONATOIR</u>	NA	NA	<u>148,015</u>
<u>Total Cost USAID/ONATOIR/Bord na Mona^{8/}</u>			<u>131,915</u>

Notes to Table II

- 1/ Includes USAID project costs
- 2/ Unallocated as to source: FrBu 50 million cost assumed to be spread over 50 years
- 3/ 1983 costs spread over an assumed life of 10 years
- 4/ 1983 costs spread over an assumed life of 3 years
- 5/ 1983 costs spread over an assumed life of 7 years
- 6/ 1983 costs spread over an assumed life of 5 years
- 7/ Unallocated as to source. Data based on purchase cost of end-1983 equipment stock spread over various number of years depending upon type of equipment.
- 8/ Includes \$1.4 billion (provided over five years) of funds provided by Bord na Mona for Technical Assistance and training.

and its use in tobacco curing. More importantly, if these studies reveal peat to be the most economic energy source, it should take steps to ensure its use. The views of the GRB in this regard should be explored as soon as possible.

The GRB may also wish to consider revising its pricing policy with respect to harvesting timber for use as fuelwood and in charcoal production. Today, because the extraction fees set are low, both fuelwood and charcoal sell far below their replacement costs. Accordingly, the GRB lacks revenues with which to sustain the reforestation effort and peat finds it that much more difficult to compete in the market place. Revising the pricing policy would no doubt be fraught with political difficulties both from the point of view of producers and consumers. Again the views of the GRB should be ascertained as soon as possible.

B. Estimated Forest and Reforestation Savings from Peat Production

Table III clearly reveals that, in terms of actual sales, peat has contributed to date - very little in terms of the preservation of Burundi's forests. Based on what might be achieved with a strong marketing effort backed up with appropriate levels of technical support, however, it has the potential to make a very large contribution. As population grows along with the demand for food, agricultural land and energy peat will, at some point in time, play a critical role in the economical and environmental life of Burundi.

C. Overall Economic Appraisal

ONATOUR is currently producing much more than it can sell and has the capacity to produce more than it is currently producing. Accordingly, while increasing production efficiency is certainly possible, ONATOUR's major problem at the present time is in the area of marketing and sales. Only when peat is sold in the marketplace is value created or savings vis-a-vis alternative energy sources actually achieved.

Given the technical problem of burning peat, competition from cheap hydro-electric power and from fuelwood and charcoal that are currently priced in the market below their replacement cost it is difficult, if not impossible, to realistically forecast what might be achieved in the way of sales (creation of value) over the next few years. Accordingly, peat's value to Burundi's economy remains largely unknown at the present time.

Certain elements on the cost side remain uncertain as well. Technological problems remain unresolved and conversion costs are unclear as are the marketing costs involved in convincing consumers to switch. The speed with which ONATOUR can save on costs through improvements in internal efficiency and by becoming independent of external technical assistance is also uncertain. As a result of these problems on the value and cost side, it would be spurious in the extreme to attempt to calculate an Internal Rate of Return for the remaining life of the project under the revised project design. It is to be hoped, however, that many of the answers and insights necessary to the calculation of a reliable Internal Rate of Return will be discovered over the remaining two years of the project as such an IRR will unquestionably be necessary before follow-on assistance can be considered. Indeed, much of the effort between now and March 1987 will be focused on such issues.

TABLE III

Subsidiary Forest-Reforestation Savings from Peat Production

	Sales	Kilos Wood Saved x 3,000,000 3,300	Tons saved	Hectares clearcut saved 24 tons per hectare	Cubic meters saved - Column 1 ÷ 650	Hectares of sustained yield saved (8.3m ³ /hectare)
1900	2,434	3,121,618	3,121.8	130.1	4,803	578.7
1921	5,570	5,063,536	5,063.6	211.0	7,790	938.6
1982	6,972	5,520,000	5,520.0	230.0	8,492	1,023.1
1993	7,852	7,138,182	7,138.2	297.4	10,982	1,323.1
1994	7,634	6,940,000	6,940.0	289.2	10,677	1,286.4
Future						
Potential low:	41,724	37,930,909	37,931	1,580.5	58,355	7,030.7
high:	46,524	42,292,546	42,295	1,762.3	65,069	7,839.6

Assumptions :

- 1 ton peat equals 3,000,000 Kilocalories
- 1 kilo fuelwood equals 3,300 Kilocalories
- 1 Hectare clearcut yields 24 tons of fuelwood
- 1 cubic meter yields 650 kilograms
- 1 Hectare sustained yield=8.3m³ each year

1934 Sales 2 x sales January - June

Potential market (low) derived from estimates of the marketing report Includes longer term demand of Army (10,000MT), Prisons (1800MT), Schools (960MT), Hospitals (240MT), Restaurants (540MT), Bakeries (864MT), Artisanal Brickmaking (3,200MT), Dairy (120MT), Durundi tobacco (10,200MT), Brick factory (3,000MT), Other (10,200MT).

Potential market (high) as above with potential tobacco market raised by 4,800 tons to a total of 15,000 tons.

In the absence of a realistic Internal Rate of Return it still seems advisable to proceed with the revised project over two more years. Substantial resources have already been committed and a large number of problems have been overcome. Though large elements of ONATOUR's future remain unclear, it seems very likely that these uncertainties can be resolved over another two years of operation provided that efforts and priorities are redirected. Even if ONATOUR's prospects are found not to be bright in the short run with respect to large-scale peat sales, ONATOUR, at a minimum, should have the capacity to keep peat as an active if small element in Burundi's energy picture. This would not be an unimportant contribution as peat is certain to be critically needed at some point in time in the future of Burundi.

Appendix A
Derivation of Comparative Fuel Costs

Kerosene

User price less taxes (transfers to GRB)	FrBu	76,408
Kilocalories per litre		8,677.7
Cost of 3 million kilocalories (ton of peat equivalent)	FrBu	26,415

Diesel

User price less taxes (transfers to GRB)	FrBu	81,955
Kilocalories per litre		9,130.43
Cost of 3 million kilocalories (ton of peat equivalent)	FrBu	26,928

Fuel Oil

User price less taxes (transfers to GRB)	FrBu	54,575
Kilocalories per litre		9,130.43
Cost of 3 million kilocalories (ton of peat equivalent)	FrBu	17,932

Appendix B

Assumptions for Calculation of Fuelwood and Charcoal Costs

Fuelwood

A hectare of land costs FrBu 60,000 to replant. On average, over twenty years it will yield 8.5 cubic meters of wood each year. Discounted at 15 percent, this production has a "present value" of 53.20 cubic meters. When produced each year the 8.5 cubic meters will have a harvesting and marketing cost of FrBu 11,331. Over 20 years these costs, discounted at 15 percent, have a present value of FrBu 70,925. Total (Present Value) cost of 53.20 cubic meters of wood is thus FrBu 130,925 or FrBu 2,461 per cubic meter, or FrBu 2,461 per 650 kilograms or FrBu 3.79 per kilo. At 3,300 kilocalories per kilo it would take 909.09 kilos of fuelwood to produce 3,000,000 kilocalories (the energy equivalent of a ton of peat) and this would cost FrBu 3,445.45.

Charcoal

A hectare of land costs FrBu 60,000 to replant. On average, over twenty years, it will yield 8.5 cubic meters of wood each year which can be converted into 739.3 kilos of charcoal. Discounted at 15 percent this production has a present value of 4,940.5 kilos. When produced each year, the 739.3 kilos of charcoal will have production and marketing costs of FrBu 4,735.80. Over 20 years these costs, discounted at 15 percent, have a present value of FrBu 29,643. Total (Present Value) cost of 4,940.5 kilos of charcoal is thus FrBu 39,643 or FrBu 18.11 per kilo. At 7,200 kilocalories per kilo, 416.7 kilos of charcoal will be required to produce 3,000,000 kilocalories (the energy equivalent of a ton of peat) and this would cost FrBu 7,553.94.

DETAILED PROJECT BUDGET.

(\$000)

<u>CATEGORY</u>	<u>Obligations FY80- FY 84</u>	<u>FY1985</u>	<u>FY 1986</u>	<u>TOTAL</u>
<u>TECHNICAL SERVICES</u>				
<u>Long-term</u>				
Marketing Advisor (PSC) (2/81 - 3/87)	355.0	85.0	-	440.0
Admin/Financial Advisor (PSC) (5/82 - 5/86)	490.0	27.0	-	517.0
Stove Designer(PSC) (3/85 - 9/86)	41.0	85.0	-	126.0
Bord na Mona Contract ^{1/} (8/81 - 3/87)	775.0	302.0	-	1,077.0
<u>Short-term</u>				
Gasification (1pm)	14.0	25.0	-	39.0
Ag.Peat Spec.(45 days)	-	15.0	-	15.0
Water Evaluation(1 pm)	-	10.0	-	10.0
Other	<u>92.0</u>	<u>20.0</u>	-	<u>112.0</u>
SUB-TOTAL	1,767.0	569.0	-	2,336.0
<u>COMMODITIES</u>				
Conversion Equipment	-	55.0	60.0	115.0
Peat Production Equip.	1,231.0	(107.0) ^{2/}	176.0	1,300.0
Lab. Equipment	-	26.0	-	26.0
Misc. Equip.	520.4	11.5	-	531.9
Vehicles	<u>573.8</u>	<u>114.0</u>	-	<u>687.8</u>
SUB-TOTAL	2,325.2	99.5	236.0	2,660.7
<u>DEMONSTRATION/CONVERSION</u>				
Skilled Labor(3 teams)	-	51.0	25.0	76.0
Construction Materials	60.0	48.0	25.0	133.0
Publicity Costs	74.2	-	-	74.2
Peat Analyses/tests	<u>20.0</u>	<u>2.5</u>	-	<u>22.5</u>
SUB-TOTAL	154.2	101.5	50.0	305.7

TRAINING

Short-term, third country	<u>109.3</u>	<u>(14.0)</u> ^{2/}	-	<u>95.3</u>
SUB-TOTAL	109.3	(14.0)	-	95.3

CONSTRUCTION

ONATOUR office	418.0	-	-	418.0
Up-country housing & offices	315.0	(77.0) ^{3/}		238.0
ONATOUR hangar	350.0	(105.0) ^{3/}	-	245.0
Bog site hangars & workshops	<u>30.0</u>	<u>135.0</u>	-	<u>165.0</u>
SUB-TOTAL	1,113.0	(47.0)	-	1,066.0

NYAMUSWAGA DEVELOPMENT

Construction	-	27.0	-	27.0
Tools & Equipment	-	1.0	-	1.0
Soil analyses	-	8.5	-	8.5
Equipment O & M	-	78.2	-	78.2
Local Labor	<u>100.0</u>	<u>25.0</u>	-	<u>125.0</u>
SUB-TOTAL	100.0	139.7	-	239.7

OTHER PROJECT COSTS

Contractor Housing rentals	415.8	170.0	140.0	725.8
Office support	70.0	23.0	10.0	103.0
Vehicle O&M	437.7	128.0	130.0	695.7
Administration/local staff	<u>263.8</u>	<u>100.0</u>	<u>103.0</u>	<u>466.8</u>
SUB-TOTAL	1,187.3	421.0	383.0	1,991.3

RECLAMATION

Peat Analyses	-	15.0	-	15.0
Local labor	50.0	-	-	50.0
Farm Equip. & supplies	-	18.0	-	18.0
Misc. Expenses	<u>-</u>	<u>22.3</u>	-	<u>22.3</u>
SUB-TOTAL	50.0	55.3	-	105.3

<u>PROJECT SUPPORT UNIT</u>	<u>-</u>	<u>200.0</u>	<u>-</u>	<u>200.0</u>
SUB TOTAL	-	200.0	-	200.0
GRAND TOTAL	\$6,806.0	\$ 1,525.0	\$669.0	\$9,000.0

- 1/ Allowances and administrative costs associated with the assignment of 1 Production Manager, 3 Master Mechanics, 1 Agronomist, 1 Drainage Engineer, 1 Boiler Specialist and short-term specialists between 10/84 and 3/87.
- 2/ Represents the reallocation/reprogramming of previously obligated funds.
- 3/ Represents the reallocation/reprogramming of previously obligated funds because of the devaluation of the Burundian franc which resulted in actual bids lower than the estimated costs of the construction.

NOTE: All figures include inflation and contingency.