Commercialisation of Innovative Woodstoves
DFID Project Ref: R6248

Final Report

Energy for Sustainable Development, Ltd.

June 1997

Contents

Annexes

Department for International Development/DFID Report on Mirte Stove

Date: 16th April 1997

Title of Project: Commercialisation of Innovative Woodstoves

Organisation: Energy for Sustainable Development Ltd

Reporting Period: from 1st April 1996 to 31st March 1997

1. Objectives of the Project

The Project was designed to develop mechanisms to harness private sector initiatives to produce and sell inexpensive, improved biomass woodstoves in Ethiopia. This, in turn, was intended to reduce wood consumption for household cooking, and to benefit low-income households.

The objectives of the Commercialisation of Innovative Woodstoves Project were to:

- develop a low cost efficient wood stove based on cement-pumice blocks, called the "Mirte" ("best", "excellent"); and,
- develop and test a methodology for commercialising this stove through private sector producers.

The Project built upon initial work carried out under the World Bank and DANIDA-supported Cooking Efficiency Improvement and New Fuels Marketing Project (CEINFMP) which resulted in the design of the Mirte, and initial market trials in Addis Ababa. The DFID project set out to commercially disseminate the stove on a larger scale in Addis Ababa, and in smaller urban areas in other parts of Ethiopia, as shown in Figure 1.1.

The project was designed to test the use of the Mirte with other non-wood fuels. It was also intended to test the production of the Mirte using materials other than pumice and cement. This would expand the geographic coverage of the Mirte by utilising other materials such as scoria/red ash and sand, which are available in many areas where pumice is not.

The project was also designed to test new modes of production, particularly production by hand, rather than mechanically, as had taken place on a pilot basis during the World Bank project. Finally, the project was designed to develop a methodology which could be used in other parts of Ethiopia and the world to promote successful dissemination of appropriate cookstoves on a commercial, sustainable basis.

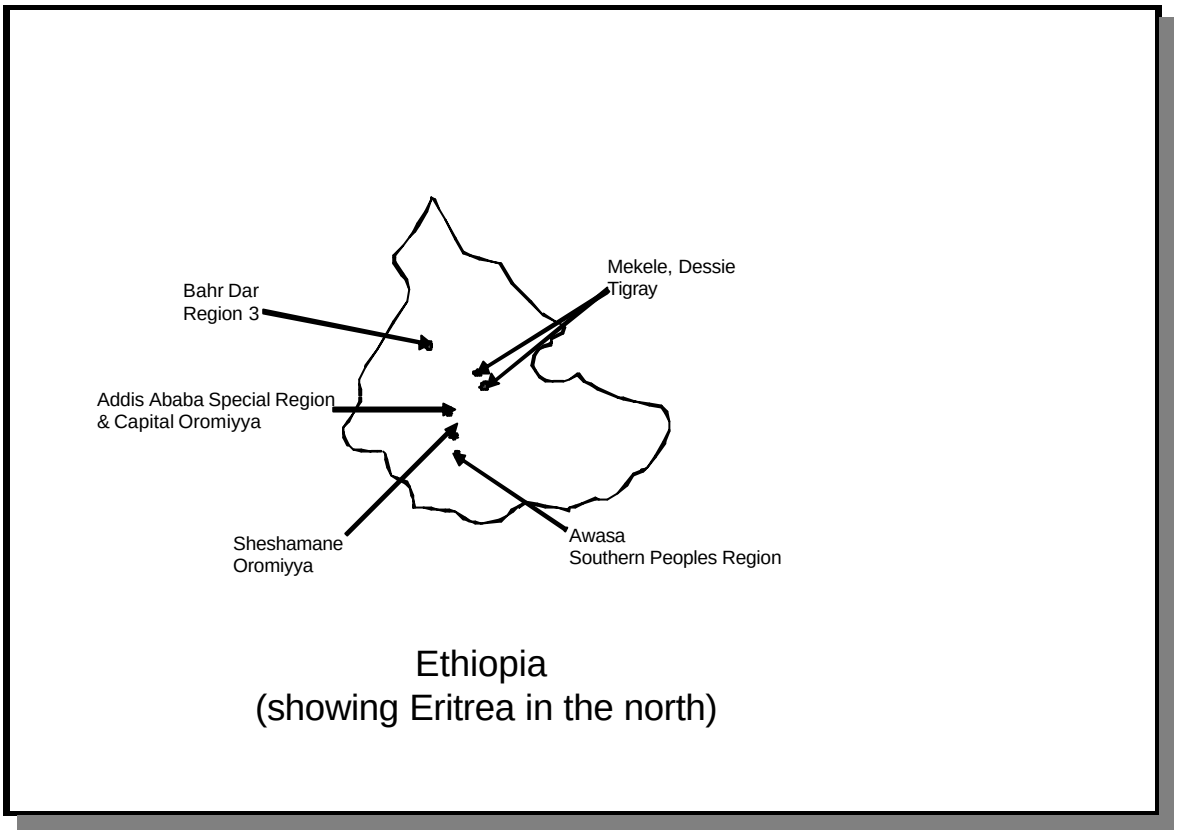

Figure 1.1: Map of Area Covered by Commercialisation of Improved Woodstoves Project in Ethiopia

2. Summary of Work Carried Out on this Project

The Commercialisation of Innovative Woodstoves Project began in April 1995, building upon activities to improve the efficiency of baking biomass injera (Ethiopian flat bread). Injera baking is the most energy-intensive activity in Ethiopia. It accounts for over 50% of all primary energy consumption in the country, and over 75% of all household energy consumption. A prototype stove (the "Mirte") had been recently developed with ESD and its Ethiopian counterparts under a DANIDA-supported, World Bank-financed project with the Ethiopian Ministry of Mines and Energy when the DFID Project began. The Mirte saves 40-50% energy during injera baking, relative to traditional methods. The DFID Project began with a six point approach and methodology, summarised in Figure 2.2, which encompassed:

- needs identification, including definition of household needs, demand and preferences, and a good definition and understanding of the private sector's abilities to meet those demands;
- design and testing, both in the laboratory (Controlled Cooking Tests/CCTs) and in households (Kitchen Performance Tests/KPTs and Impact Assessments);
- producer training and technical assistance
- market trials and acceptability assessment;
- full-scale marketing and commercialisation;
- acceptability follow-up and adaptation of the product to meet consumer needs.

The Team tested and adapted the Mirte to cook injera with other fuels, namely agricultural residues and dung, which are used extensively in many parts of Ethiopia. The Team also adapted production of the stove to utilise other construction materials, specifically scoria/red ash and other common building materials. This required identifying material resources, defining costs, developing prototypes, and then testing these in the laboratory, the household and marketplace.

During the Project, the team focused on the Addis Ababa Region (Region 14), the Southern Peoples' Region (Awasa), Region 4 (Shashemene, Nazareth and surrounding areas), and northern Ethiopia including Region 3 (Gojjam, Bahr Dar, Gondar) and Region 1 (Tigray), as shown in Figure 1. Awasa and the Southern Peoples Region provided the forum for testing the pumice-cement stove with agricultural residues. Nazareth in Region 4 provided the area for testing the Mirte with animal dung. The scoria/red ash stove was produced, tested in households and commercialised in Bahr Dar where over 2,000 stoves have been sold since July 1996. A building materials stove, utilising sand instead of pumice or scoria, was developed and tested in Tigre, where the stove is selling very well.

Figure 2.1: Traditional Injera Baking on Three Stone Fire, Addis Ababa

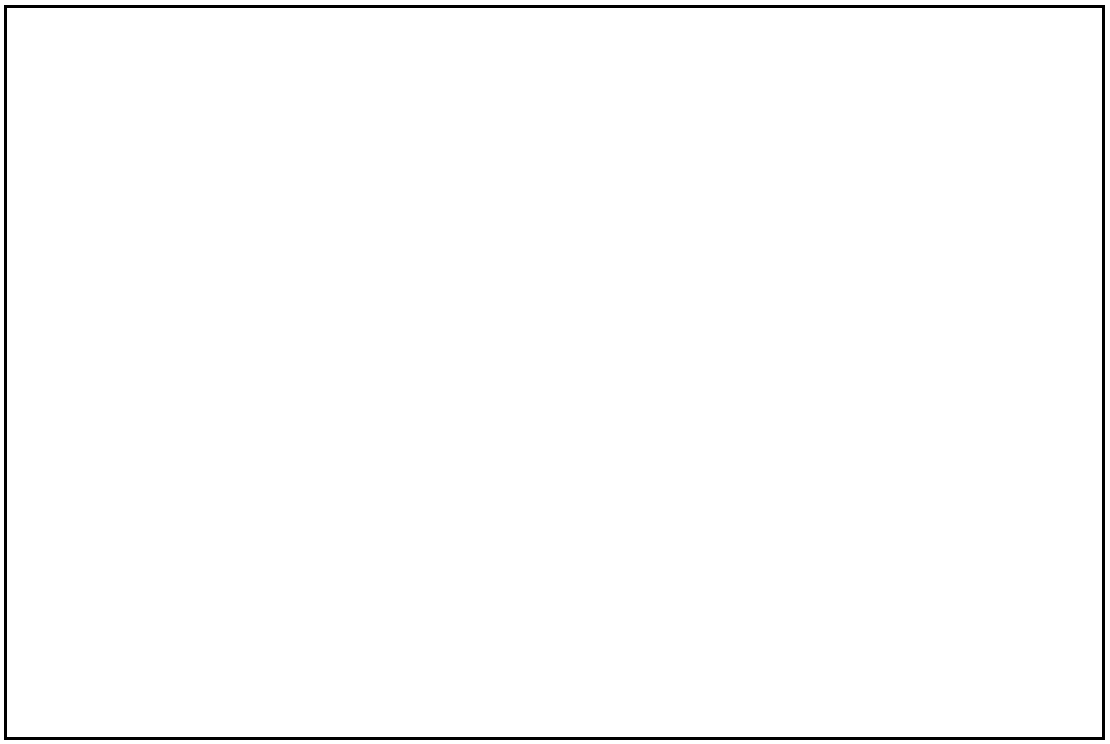

Figure 2.1: Traditional Injera Baking on Three Stone Fire, Addis Ababa

Bahr Dar (Region 3) served as the area for testing and producing the scoria-cement mix Mirte, while Mekele (Region 1) served as the production and test point for adapting the Mirte to using other common building materials, namely sand and cement. In all cases, with the exception of animal dung, the Mirte performed as well with these other fuels and materials as with the original woody biomass pumice-cement stove designed in Addis Ababa.

Additionally, the Team experimented with a Mirte adapted for small-scale commercial injera baking. These laboratory and household tests also proved very positive. Ten prototypes were installed in commercial baking households for a kitchen performance test. The test results were positive, although the stove needs modification to better meet commercial injera bakers' requirements.

The Team concentrated on quality control of production through training and technical assistance, and on follow up and evaluation to monitor the stove's progress. The Team made necessary modifications in design, production and promotion of the Mirte based upon these follow up results. Sales increased from less than 50 stoves per month at the beginning of the Project (April 1995) to over 1,500 per month by the end of the Project. The Project's methodology is highlighted in Figure 2.2. This has proven to be very useful for adaptive management and for rapid commercialisation of Mirte stove.

This demonstrated that the Team's methodology worked under a variety of circumstances,

using a number of different fuels, in a number of different cultural and market situations. This methodology is relevant to other technologies, not only in Ethiopia, but in other parts of the world. It is adaptive. It relies on proper needs assessment, mobilisation of local skills and resources, continuous market and consumer feedback, adaptation of the technology and the marketing approach, small amounts of capital provided through small, easily accessed revolving funds (Annex 1), promotion geared to fit local needs and tastes, and follow-up. The approach also focuses on monitoring and evaluation of production, consumer and market results to produce a better quality product and to make the Mirte more relevant to diverse households.

This methodology worked very well with the Mirte and has ensured that the stove is now commercially produced in a dozen areas in Ethiopia by over 30 production units employing over one hundred people. Mirte commercialisation is sustainable, and is expanding rapidly to small urban and rural areas in Ethiopia, away from the larger urban areas. One quarter of all Mirte stoves produced during the last six months of the Project were sold in rural areas. Half of all Mirte stoves are presently produced in smaller towns (ie, outside Addis Ababa), while all new production units and sales outlets established over the past six months have been set up in smaller urban areas including Gondar, Mekele, Hosanna, and four others.

Stove sales have rapidly moved into rural areas for the first time. The major demand for these stoves is in the rural north of Ethiopia where woody biomass is very scarce. Moreover, there is growing disposable income in these rural areas. Hence, demand for the Mirte is rising dramatically in these dispersed rural areas, and private sector production and marketing has started in earnest in these areas. This has enormous implications for the Mirte, because demand in smaller urban areas and in rural cash economy areas could easily lead to sales in the hundreds of thousands, if production can be organised, and if the Mirte can be properly and effectively promoted.

Furthermore, women have participated actively throughout the Project, both as trainees, as producers and as installers. They have been the primary beneficiaries of the Project both as household cooks and as small-scale commercial injera bakers who bake and sell from their homes. Extensive Project surveys show that the majority of these injera bakers who have purchased the Mirte are single heads of household who depend upon injera baking as their primary, if not sole, source of income.

The Mirte has appealed to large number of household commercial bakers because the stove vacates the smoke away from the cook, reduces smoke through more complete combustion, protects cooks from flames, and, of course, reduces energy consumption and expenditures by nearly half. The health and safety benefits appeal to all Mirte purchasers, and figure as the most oft-cited reasons for purchasing the stove. That is, these features are cited more frequently, or at least as frequently, as the stove's energy savings. Furthermore, the Mirte is viewed as a "modern" household device, which is an important improvement

over "traditional" open fire cooking. These factors add to its commercial appeal and account for its remarkable commercial success.

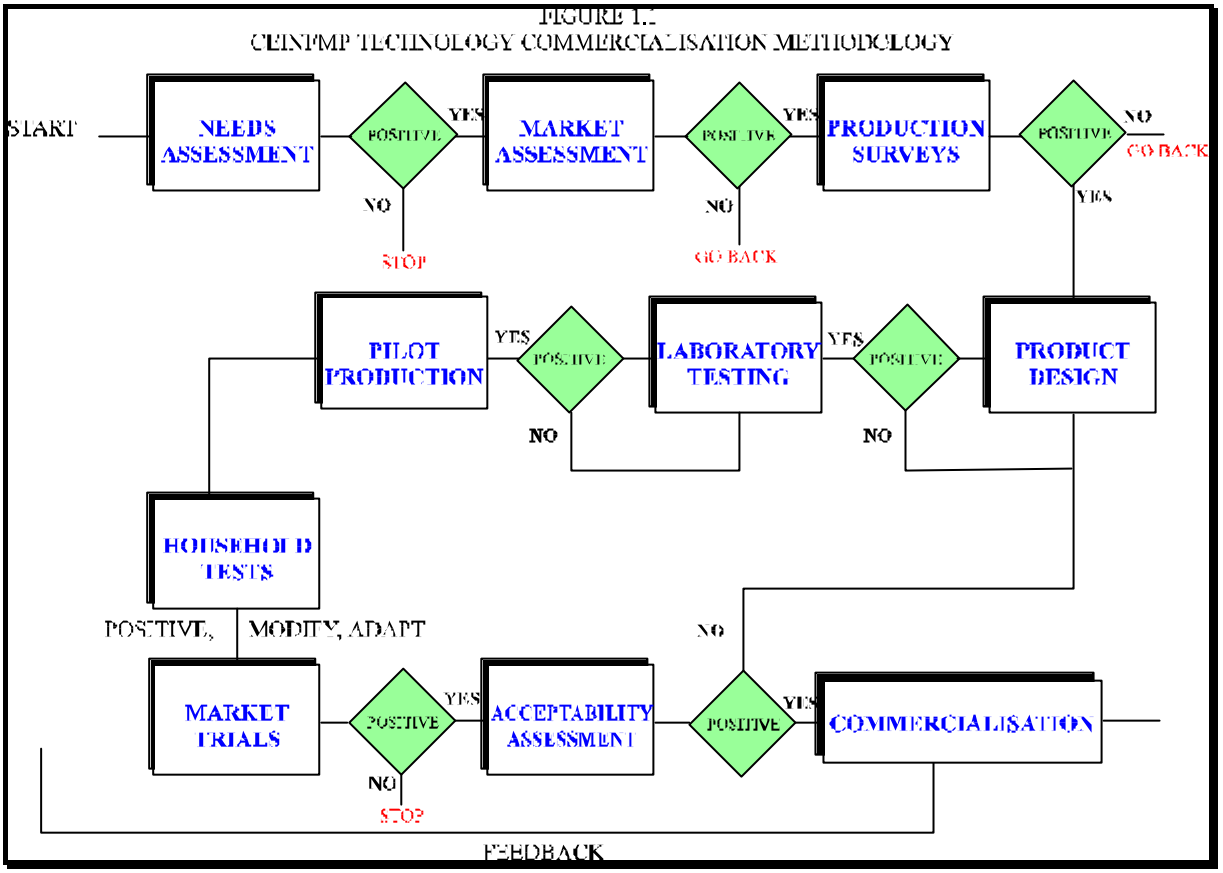

Figure 2.2: Mirte Commercialisation Methodology and Strategy

The commercial potential for this improved cookstove is enormous. If current market trends continue, over 100,000 Mirte stoves will be in use by the end of 1998, and over a million could be in use by the end of the year 2000. This requires constant attention to promotion, to technical assistance and quality control, to provision of business, management and marketing skills for producers, for follow up and on-going advice for producers, and on the judicious use of small amounts of credit to help producers begin and expand production and sales.

Table 2.1
Commercialisation of Innovative Woodstoves
Original Logical Framework Verification Indicators

Narrative Summary	**Measurable Indicators**	**Means of Verification**	**Important Assumptions**
Goal: Efficient use of domestic energy.	Sales of improved stoves	Sales records	(Goal to supergoal) Stoves are used correctly
Purpose: Reduced cooking costs for low income households	Lower expenditure of time and money for fuel collection.	Household trials to determine fuel consumption and expenditure.	(Purpose to goal) Stove purchase by lower income groups
Outputs: 1 Stove commercialisation in Ethiopia. 2. Improved stove design for households. 3. Enabling methodology for replications.	Private sector infrastructure. Lower fuel consumption. Published report. etc.	No. of producers. Stove price Kitchen performance monitoring. Report distribution.	(Output to purpose) Stove production remains profitable. Statistical accuracy of survey results. Receptivity of programme personnel.
Activities: 1. Stove development 2. Household trials 3. Producer training 4. Market trials 5. Acceptability tests. 6. Methodology report	£45,850 £26,200 £5,750 £24,600 £2,200 £8,500	Controlled cooking tests & durability trials. Fuel measurements & questionnaire administered by enumerators in 40 households. Quality of stoves sold & follow up questionnaire with purchasers. Acceptability test administered by enumerators. Research results & report.	(Activity to output) Controlled cooking tests is representative of household performance. Households are representative. Quality does not drop. Stoves are used. Measureable market penetration.

Table 2.2
Commercialisation of Innovative Woodstoves
Project Results Set within the Original Logical Framework

Targets & Objectives	**Measurable Indicators**	**Means of Verification**	**Verification**
Goal: Efficient Domestic Energy Use	Sales of Improved Stoves	Sales Records	Over 15,000 Mirte stoves sold, with recorded sales records with producers and with ESD
Purpose: Reduced Cooking Costs for Low Income Households	Lower Expenditures of time and money for fuel collection	Household trials to determine fuel consumption and expenditure	2 Kitchen Performance Trials carried out; 1 in Awasa on agri-residues, one in Bahr Dar on scoria Mirte,. Impact Assessment in Addis on prototype commercial Mirte. Over 750 follow up interviews of purchasers to gauge responses. Fuel consumption and expenditures for households dropped 50%, and 60% for commercial bakers.
			Extensive household CCTs carried out in Mekele and Gondar on stove, with over 860 sold by end of March, and 100 follow up surveys show reduced fuel expenditures.
			4 Acceptability Surveys conducted in Awasa, Addis Ababa, Bahr Dar and Mekele show reduced consumption and expenditures on order of 50%.
Outputs: 1.Stove Commercialisation	Private sector infrastructure	39 private sector installers	31 producers producing
	Lower fuel consumption	31 active private sector installers	31 installers selling
	Published report, etc.	4 revolving funds	Funds active & repayment 100%
		10 small loans	Loans used well, 100% repayment
		36 small grants	Grants put to good use, improved production and sales
2. Improved Stove Design		Scoria/red ash Mirte	Design Successful, most popular stove now in Addis Ababa, Bahr Dar and Gondar
		Sand/Building Material Mirte	Design Successful in Tigre (Mekele), 860 stoves sold
		Attempt to Modify Door	Design Modification unsuccessful, no need for further work
		Commercial Stove Design	Design partially successful. KPT carried out. Users happy, but stove not robust enough yet
3. Enabling Methodology for Replications		New Areas for Production & Sales	Current production in 9 new towns in Regions 1, 3, 4 and Southern.
		Increased Competition	TA & Training of over 100 new producers. Stove prices dropping in Addis Ababa due to increased competition. New stove producers trained in each geographic area to increase competition.
			Consumer prices stable or falling in Addis Ababa and Bahr Dar
			Producer prices falling in Addis Ababa
Activities: 1. Stove	1. Appropriate Stove	**Controlled Cooing Tests**	Over 5,000 stoves sold using scoria, which is

Development	Designs	**& Durability Trials::** Scoria/Red Ash Mirte	cheaper and more widely available in many places
		Sand/Building Materials Mirte	Over 860 stoves sold, three producers producing
		Commercial Stove	24 stoves sold & used

Targets & Objectives (continued)	**Measurable Indicators (continued)**	**Means of Verification (continued)**	**Verification (continued)**
2. Household Trials	**2. KPTs & Impact Assessments**	**Fuel measurements & questionnaire:** Household Tests	2 KPTS and 1 Impact Assessment (commercial bakers) held & successful
		Quality of stoves & folow up questionnaire with purchasers: Acceptability Follow Ups	Over 750 households interviewed post-sales in 4 urban areas. Over 90% of households still using Mirte over 6 months after purchase. Over 95% satisfied with Mirte.. Random visits to over 150 households to take measurements, gauge performance of Mirte.
3. Producer Training	**3. Workshops, formal and Informal Training**	**Training:** 23 Workshops held	119 new artisans trained, with 90% currently active
		12 Intensive training sessions	85 trained, over 90% still active
		On-the-job training	100% active producers & sales
4. Market Trials	**4. Sales & Consumer Feedback**	**Sales:** Sales Records	Over 15,000 Mirtes sold according to records kept by 39 producers, and ESD Ethiopian Team
5. Acceptability Trials	**5. Sales & Consumer Feedback**	**Acceptability test administered by enumerators.**	4 Acceptability Surveys carried out; 95% respondents using Mirte 6 months after purchase Over 190 market demonstrations carried out to over 300,000 viewers. 44 radio programmes reached hundreds of thousands of viewers Television programmes reached hundreds of thousands of viewers
6. Methodology Report	**6. Report**	**Research results and report**	**Report** Completed & Reviewed by All Key Participants.. **Video** produced in Amharic with English sub-titles. Over 30 videos distributed to regional and local authorities, Information Bureaux. 20 videos sent to international organisations and groups including UNEP/Risoe in Denmark, CREST Stove Network, ILO (Small Enterprise Support Group), World Bank (ESMAP and various Task Managers for Africa and Asia), ADEME (France), GTZ (Germany), US NREL , World Development Council, other international groups. **Photos** and **methodology** on the World Wide Web (CREST Stove Network), NREL Renewable Energy Links. Dissemination results on ESD's WWW homepage.

			Methodology report distributed to over 20 agencies and groups. Article in forthcoming ***World Development Aid & Joint Venture Finance 1998/99*** Worldaware article written and published. ODA TDR report written and published.

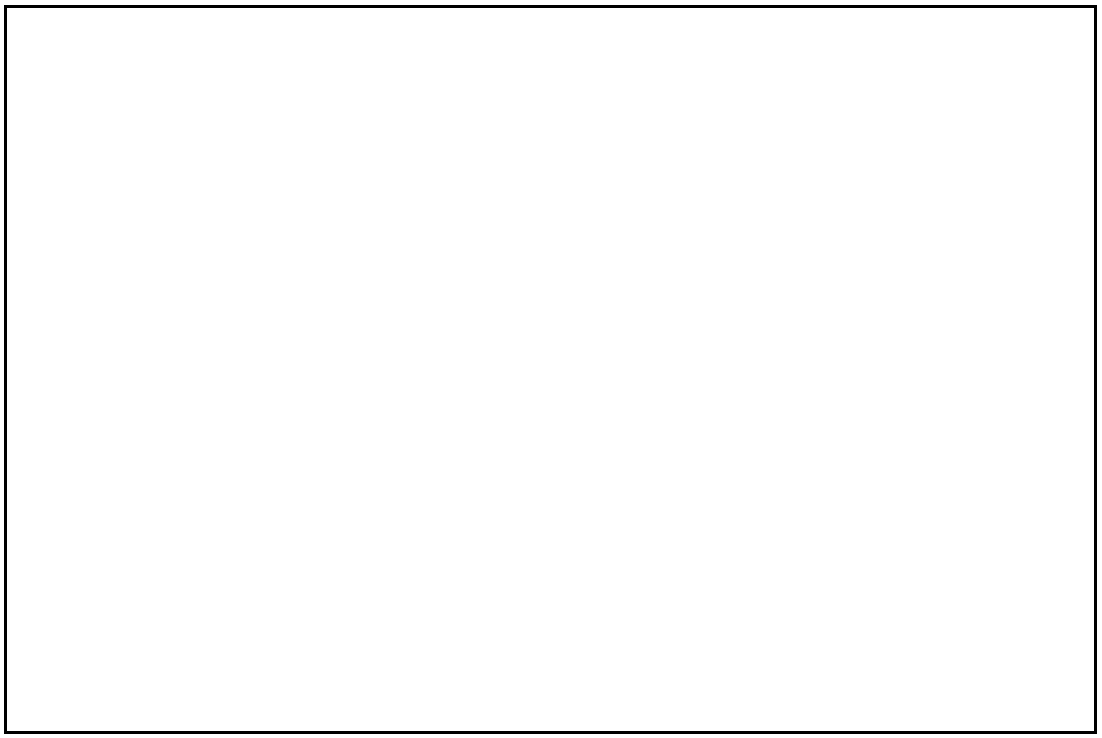

Figure 2.3: Mirte Installed in Addis Ababa Household after Six Months' Use

2.1 General Management

The Project was managed by ESD and supported by a core of dedicated Ethiopian professionals. The Team was divided into functional groups comprising management, a technical and testing team, a commercialisation and promotion team, and a socio-economic team. Team members developed extensive interdisciplinary skills which enabled them to work in a variety of roles interchangeably. This made the Team more flexible, and allowed the Team to respond quickly and easily to the wide variety of different needs of Ethiopia's heterogeneous consumers and producers, and to the demands of its highly decentralised local governments. Management was by consensus, and management plans were drawn up collectively on a quarterly basis, updated weekly, and adapted frequently to meet changing circumstances. Targets were set in this manner. When targets were not achieved, the Team analysed the reasons and set out new targets incorporating lessons learned.

The Team worked with a wide range of private, non-governmental and public sector individuals and agencies. The Team had most success working with regional and other local authorities to promote and commercially disseminate the Mirte. This followed closely the official philosophy of the Government of Ethiopia (ie, the devolution of power to local authorities). It also provided a major source of strength to the Project Team by enabling it to adopt a flexible, multi-faceted approach which is the hallmark of successful commercialisation in a diverse society such as Ethiopia's.

The Project Team was based in Addis Ababa, where considerable effort was spent to improve the stove, to define and develop commercialisation and promotional strategies, and to gain the commercial confidence that came with success in a large, sophisticated market. The Project worked in three other regions of Ethiopia both to develop and commercialise stoves made from different building materials and to test important markets. Additional tests were carried out using other fuels, namely agricultural residues in Awasa and Shashemene, and dung in Nazareth. The Mirte performed extremely well with crop residues, but poorly with dung. As the Project progressed, the Team developed strong links with producers in smaller urban areas and developed the contacts and confidence to expand production to market to wider, more decentralised markets.

New skills and techniques were developed in each of these important areas that are already being rapidly disseminated to other geographic areas of Ethiopia. The Project's objectives of commercialising the Mirte over a wide geographic area, particularly in smaller urban areas, was very successful. As important, the Project's intent to begin commercial dissemination of the stove to Ethiopia's large rural population began in earnest towards the end of the Project and is proceeding rapidly through a strong, well-supported network of producers, who are, in turn, supported by local authorities and NGOs.

2.2 Stove Development

The Project Team started the Project by testing stoves built with other building materials which are widely used for producing "hollow blocks" (moulded cement mixture bricks). Initial production was carried out by mechanised building materials producers. Within six months of Project start up, however, the Project had trained twelve hand producers. By Project's end, over 95% of all Mirte stoves sold during the Project's lifetime were produced by hand by small-scale artisans. This shifted the emphasis of the Project markedly, and demonstrated that the Mirte could be produced by hand, by local artisans virtually anywhere in Ethiopia. With the right moulds, proper training, good technical assistance, basic business skills training, and periodic follow up, the Project demonstrated that dozens of producers, located all over Ethiopia, could be served and supported by a small, core team of professionals.

The Mirte was originally designed to use light weight pumice, which is a major source for constructing building materials in Addis Ababa and other areas in Ethiopia's Rift Valley. However, pumice is not found throughout Ethiopia. Scoria, or red ash as it is popularly known (another volcanic material), is widely found in other areas of Ethiopia, particularly in northern Ethiopia, where pumice is either unavailable, or is very expensive. Given scoria's wide use in the building materials industry, the Team began to experiment with it in late-1995 to determine its suitability for the Mirte. The Team reasoned that if scoria could be used for Mirte production, then, this would increase the stove's range of production several fold.

Prototype red ash/scoria Mirtes were produced and optimised in early-1996. Extensive laboratory tests conducted by the Team proved positive. Household kitchen performance tests (KPTs) were carried out in Bahr Dar on the scoria/red ash Mirte during April and May 1996. These household tests proved very positive, and the stove proved very popular with the test households. The scoria Mirte is now under commercial production in Addis Ababa and in northern Ethiopia. Over 6,000 scoria stoves have been sold since mid-1996.

A reconnaissance team visited Mekele, Tigray in April 1996 to make an initial assessment of the potential for producing and marketing the Mirte in this part of northern Ethiopia. This reconnaissance verified earlier observations that neither pumice nor scoria red ash are found in most of Tigray. This meant that if the Mirte was to be produced in this marketplace, it would have to be produced with river sand and cement, the primary building materials in Tigray.

The Team produced a prototype Mirte from sand and cement. It was then tested in the laboratory using controlled cooking tests (CCTs) during July and August 1996. These CCTs showed almost identical efficiency improvements over the open fire and virtually comparable efficiency improvements over the open fire as the pumice-cement Mirte (ie, on the order of 40-45% improvement over the open fire), using the standard Mirte moulds. The Project then conducted field trials and extensive field cooking tests in Tigray. These trials proved positive. The Team trained artisans and began full-scale commercialisation of this adapted Mirte in early-1997. To date, over 860 Mirte stoves have been sold in Mekele.

This adaptive approach to stove development has demonstrated that the Mirte is, indeed, an appropriate stove for most Ethiopian production and cooking conditions. It shows that the stove's design, and its modes of production, permit production using a variety of materials under a variety of production conditions. Effectively, the Project demonstrated that the Mirte can be produced anywhere in Ethiopia, thereby reducing its costs and making it a relevant technology for a very broad range of consumers.

2.3 Household Trials

The Project was designed to test the Mirte utilising different fuels and different building materials relevant to conditions in Ethiopia's heterogeneous population and geographic conditions. The first household tests (Kitchen Performance Tests/KPTs) were carried out in Awasa, Southern People's Region during late-1995 to test the performance of the Mirte using a range of different fuel mixes. Ethiopia households utilise a very wide variety of fuels for baking injera, ranging from dung to crop residues. The Awasa KPTs were designed to test the performance of the stove using crop residues in this rich agricultural area.

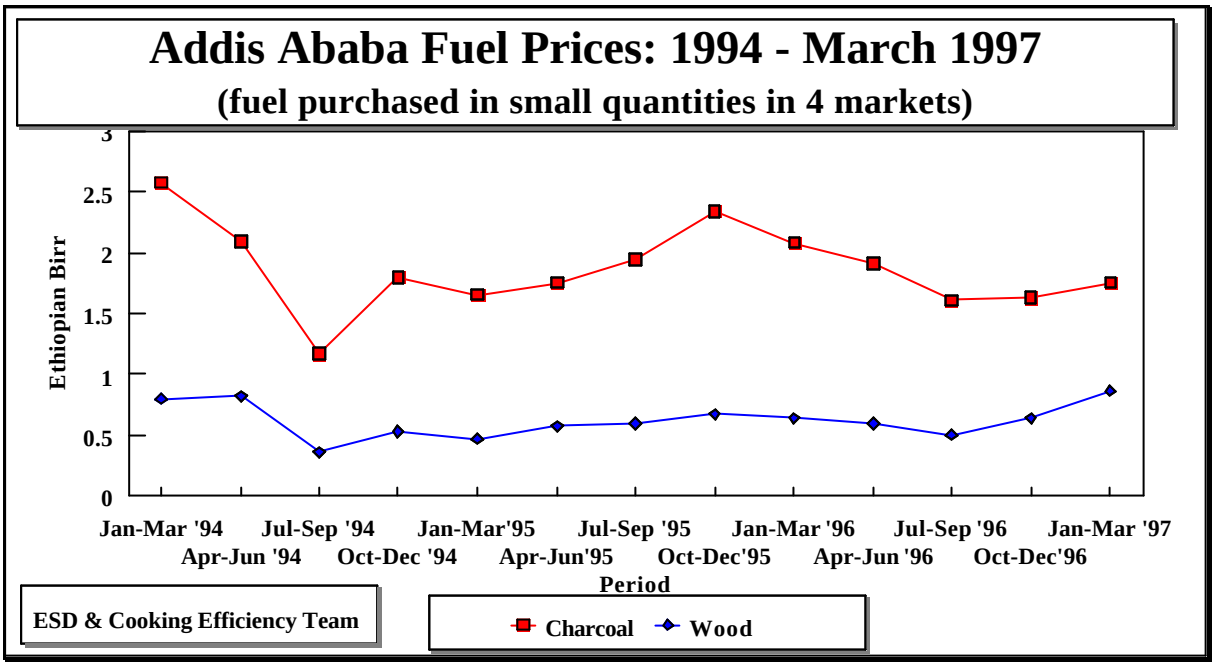

Figure 2.4: Addis Ababa Fuel Prices in Four Major Markets, January 1994 to March 1997

Table 2.2
Addis Ababa Fuel Price Surveys
January 1994 to March 19971

Quarter	*Char(EB/kg)*	*Wood(EB/kg)*
Jan-Mar '94	2.57	0.79
Apr-Jun '94	2.08	0.80
Jul-Sep '94	1.16	0.34
Oct-Dec '94	1.79	0.52
Jan-Mar'95	1.65	0.46
Apr-Jun'95	1.75	0.57
Jul-Sep '95	1.94	0.58
Oct-Dec'95	2.33	0.66
Jan-Mar '96	2.08	0.63
Apr-Jun '96	1.90	0.59
Jul-Sep '96	1.60	0.50
Oct-Dec'96	1.62	0.63
Jan-Mar '97	1.75	0.86

Source: ESD and Team Market Surveys

1 One Pound Sterling (£) was equivalent to approximately Ethiopian Birr (EB) 10.50, 31st March 1997.

These household trials showed positive results. In fact, these tests showed the Mirte performed better with crop residues than with wood and woody biomass fuels. These trials were later confirmed by tests carried out with commercial injera bakers in Addis Ababa who use sawdust, coffee husk waste, and other materials.

Scoria/red ash-cement Mirte stoves were first tested in Addis Ababa in late-1995. These tests proved positive and showed the scoria stoves were as efficient as the original optimised pumice-cement Mirte stoves. Initially, thirty scoria/red ash stoves were produced in Bahr Dar and installed in thirty test households in April, 1996 for a Kitchen Performance Test (KPT). These tests were carried out over a period of six weeks. They showed a consistent improvement in efficiency of approximately 50% when using the Mirte, relative to an open fire.

Full-scale commercialisation commenced in Bahr Dar in light of these results. Additionally, because scoria is used widely in Addis Ababa, and because it is less expensive than pumice, the Team began to train artisans to use scoria for Mirte production in Addis Ababa.

Tests using dung were disappointing. Dung is an important fuel in perhaps 5-10% of all urban households, and many more rural households, particularly in the far north of Ethiopia where woody biomass is most scarce. It is a very important fuel for certain baking periods, particularly around Easter and other feasts for speciality baking. Dung has different thermal characteristics to wood, and most other biomass. Dung cakes are flat and large. There is considerable difficulty in igniting them and maintaining constant combustion unless there is air flow all around the cakes.

Tests were carried out with dung using the Mirte in Nazareth. These tests proved negative. The Team decided to concentrate on more widely used fuels, such as agricultural residues, and on other building materials, such as scoria/red ash, and sand, rather than spend scarce Project resources on optimising a Mirte for burning dung. However, this remains an area for design and testing in the future.

2.4 Producer Training

The Team carried out over twenty training sessions in four regions in Ethiopia, in over 20 towns and centres, as Table 2.3 shows. One hundred and seventeen trainees, nearly 54% of them women, received training from the Project staff. The Team conducted training through a number of venues. It worked with local authorities in four regions to carry out twelve training sessions. The Team worked with NGOs to conduct four training sessions. The remainder of the training sessions were carried out by the Project with private producers who have indicated their interest to receive such training. The Team developed a core format for initial, on-going and follow up training.

Moreover, the Team conducted a series of follow-up training sessions to improve producer skills and quality control. The Team also carried out a number of training sessions to improve business skills (Annex 2). A set of notes and instructional materials were prepared in the Amharic language on basic business practices in such areas as accounting, simple bookkeeping, management and marketing (Annex 2).

Table 2.3
Training Carried Out by the Mirte Project
August 1995 to March 1997

Location	Region	Dates	No of Participants	Women Participants
Addis Ababa	14	Various sessions	18	18
Awasa	Southern	September 1995	2	
Shashamene	4	September 1995	1	
Nazareth	4	October 1995	2	
Adaba	4	May 1996	1	
Bahr Dar	3	March 1996	13	13
Addis Ababa	14	June 1996	15	
Bahr Dar	3	June 1996	8	1
Awasa	Southern	July 1996	2	
Nazareth	3	July 1996	2	
Assela	4	January 1997	12	6
Sirre	4	January 1997	1	
Mekele	1	January 1996	6	4
Gondar	3	February 1997	15	14
Kosober	4	February 1997	14	6
Hosanna	4	December 1996	5	1
Total			117	63

Source: ESD and Cooking Efficiency Team

Small-scale business training in such fields as simple bookkeeping, accounting, stock management, procurement, business management, promotion and marketing was considered by the Team as essential to successful business, and as important as other technical training. Therefore, the Team developed a set of specific "modules" for business training that ranged from introductory to more extensive for revolving fund credit applicants (Annex 2).

The Team adopted the strategy that provision of basic training in business development was an essential element to ensure the long-term commercial viability of the Mirte, and of the commercial success of small-scale producers. The Project set up three small revolving funds for dispersing small amounts of credit to producers, and business training was a prerequisite for receiving credit. Revolving fund monies were used for specific purposes

such as building shelters for production units, promoting the Mirte in new markets, buying new moulds to expand production, among others.

Each revolving fund was headed by a committee who reviewed loan applications (Annex 1), and who made recommendations on how to proceed with credit. They recommended what skills needed to be strengthened, what requirements need to be met, and so on. The Project made eleven loans under these revolving funds, with an average loan size of £200 equivalent. One hundred per cent of all loans were repaid within their contract period. All loans were put to good commercial use.

Business training was a pre-requisite for receiving credit from the Project. All recipients receiving training in basic business skills, particularly bookkeeping, accounting and management. The Team believes that this was essential to the success, and to the expansion, of all businesses that were assisted. One of the eleven recipients was a woman, while all recipients were low-income, small-scale producers who began Mirte production during the course of the Project.

Table 2.4
Mirte Revolving Fund Disbursements

Number	Region	Gender	Amount (EB)	Date Received
1	Addis Ababa	M	2500	01-Apr-96
2	Addis Ababa	M	3000	01-Apr-96
3	Addis Ababa	M	2488	01-Apr-96
4	Addis Ababa	M	2359	01-Apr-96
5	Region 4	M	3000	01-Jun-96
6	Addis Ababa	M	488	01-Sep-96
7	Southern	M	1000	01-Nov-96
8	Southern	M	3000	01-Nov-96
9	Region 3	F	1000	01-Jan-97
10	Addis Ababa	M	2000	01-Feb-97
11	Addis Ababa	M	1600	01-Feb-97

Table 2.4 shows the number of recipients of interest free loans for eligible Mirte producers trained by the Project. Annex 1 shows the criteria for loan eligibility and the process for selection and approval of the 11 loans made. Repayment is being made for the last three loans which were made in early-1997.

2.5 Market Trials & Commercialisation

The next stage in the process of successful commercialisation of the Mirte built upon the training, technical assistance, and laboratory and household testing conducted to gauge consumer response. It involves working with trained producers to commission a certain

number of stoves, to have the private sector produce those stoves, and then to market and promote them to the greatest extent possible. When these initial market trials proved positive, then the Project moved into full-scale promotion and commercialisation of the stove. This involved public demonstration, radio advertising and other means of promotion. The most important means of promotion during the Project proved to be demonstrations in marketplaces in each targeted area.

One hundred and eighty nine public demonstrations were conducted during the life of the Project, 122 in Addis Ababa and the rest throughout Ethiopia. The average number of viewers during the Addis Ababa demonstrations was one the order of 2,000, while the average number in other areas was on the order of over 1,000 people. The Project Team believes that over 300,000 people watched these demonstrations over the two year period. Follow up household surveys showed that over one third of all Mirte consumers saw the Mirte demonstrated in market places, while a further one third heard about the Mirte from friend, neighbours and relatives who saw the demonstrations.

The Team also aired 44 radio spot programmes for the Mirte. Nearly a quarter of all households said they bought the Mirte after hearing it advertised on the radio. Television was too expensive for Mirte advertising, although the Team believe that this medium would have enormous positive impact on sales of the stove if funding for such could be made available, or if Ethiopian Television (ETV) would air the programmes as a public service.

Market trials followed household tests in Awasa and Bahr Dar. Market trials also followed initial work carried out in Gondar and Mekele in northern Ethiopia. Given the fact that the Mirte was so successful in household trials in Addis Ababa, Awasa and Bahr Dar, and that consumer acceptance was so high, then, active promotion followed producer training in all other areas in which the Team operated.

There are now seventeen producers in Addis Ababa, nine in southern Ethiopia, and thirteen in northern Ethiopia (Table 2.5). Of these, 31 are currently full-time Mirte producers employing over 60 people full-time. One woman and two women's groups are producing the Mirte in Addis Ababa. Six out of 31 installers in Addis Ababa are women. The most successful Mirte producer in Bahr Dar is a woman, and new women producers are actively producing in Gondar.

Producers have produced and sold over 15,000 stoves since the Project began. Producers and the Team estimate that sales are at least 25% higher than recorded, given the highly decentralised nature of production outside Addis Ababa, and the associated difficulties of the Project to track sales in these highly dispersed areas. The Project's only inputs in this process of rapidly escalating sales have been training, technical assistance, provision of initial credit to set up operations and promotion.

Table 2.5
Production Units Established During the Project

Location	*Region*	*Number*
Addis Ababa	14	13
Bahr Dar	3	5
Awasa	Southern	4
Gondar	3	
Kosober	4	3
Other	1,4,14, other	11
Total		39

2.6 Acceptability Tests

The Team has interviewed over 750 households throughout Ethiopia to determine the Mirte's acceptability, with 550 carried out in Addis Ababa, and over 200 in other areas. These follow up interviews were conducted six months after stoves were sold in order to gauge attitudes and performance after at least six months' use in households. A series of directed questions were posed to consumers regarding the stove's acceptability, its use, and recommendations for improvements. Enumerators also noted any changes made to the stove. These acceptability interviews continue to show widespread acceptance of the stove in all geographic areas with over 95% of all households continuing to use the stove 6 months after purchase. They provided the Project with good guidance on how to improve production, on how to make promotion more effective, and how to give better support to Mirte producers and installers.

Almost all households use the Mirte six months after installation. While the overwhelming majority express satisfaction with the stove, a quarter of all households made modifications to the fire door to enable them to utilise larger wood pieces. The door was widened by households either by chipping it wider, or by digging under the firebox in order to feed larger sized pieces of wood. Over a quarter of all consumers expressed the desire to have a wider door, although they also expressed overall satisfaction with the Mirte.

The Team took these results into consideration. Tests were carried out during late-1996, early-1997 to determine the performance of the Mirte under conditions with modified fuel inlets. Inlet height was increased by a third. Ten controlled cooking tests (CCTs) were conducted on these modified Mirtes to simulate changes that had been observed in household acceptability surveys. The results showed no statistical improvement or reduction in efficiency of the Mirte under these conditions.

This was very encouraging to the Team. It demonstrated that the performance of the Mirte

remained basically the same even after slight deterioration around the inlet caused when households load fuel into the Mirte. The Team is not contemplating modifying the stove to these dimensions. Rather, these results merely demonstrate that the Mirte performs well under a variety of circumstances and that no important design modifications are necessary to maintain the stove's efficiency under actual household use.

3. Results of Findings Obtained by the Project

3.1 Stove Development

.

The Project adapted the initial Mirte design to incorporate local building materials available throughout Ethiopia. Until prototypes were built, until laboratory tests were conducted, until households and the markets were tested, and until producers' responses were gauged, it was not clear whether these new materials would actually maintain the stove's efficiency, or be socially and commercially acceptable. However, the new materials proved to be as efficient as the pumice-cement mix and as acceptable to consumers. In fact, the scoria-cement mix has proven to be even more popular in Addis Ababa because it is cheaper to produce, and because the scoria increases the robustness and durability of the stove. This has helped producers cut costs, and has extended the lifetime of the stove. This has improved its marketability.

The second major area of stove development was the introduction of hand production of the Mirte. It was always hoped that the stove could and would be hand produced, because the potential for small-scale artisanal hand production is much greater than mechanised production, given the low margins on each stove. That is, without large volumes of sales, mechanised producers show little interest in the stove.

Hand production proved to be ideal for the Mirte. It enables small-scale entrepreneurs to get into a new line of business. It provides a means for highly decentralised production, thereby expanding the geographic range of the product. It reduces the costs of the stove. It achieved social and development equity objectives by supporting small and micro enterprises. As the Project's training and production figures show it also provided a venue for women to enter the commercial market place.

These two important features of stove development and production strategy have widened the scope of the Mirte enormously. As is already being demonstrated at this time, the Mirte is rapidly evolving from a large urban area product to a household device sold in smaller urban areas, and increasingly, in rural areas. Project statistics show that nearly one quarter of all new sales over the past six months were to rural households, primarily those engaged in cash crop agriculture. There is a tremendous commercial market in Ethiopia where over 500,000 civil servants work in thousands of small towns. The rapid recovery of Ethiopia's cash crop economy has put considerable disposable income in tens of thousands of new rural households. These factors indicate that the Mirte is now finally moving into the biggest market of all, rural Ethiopia.

The implications of this, in terms of wood savings and the environment are of major import. The Mirte reduces fuel consumption by nearly half. It is no accident that this phenomenon of growing rural sales is occurring most rapidly in the wood poor northern areas of the country.

This, indeed, was one of the major objectives of the Project. Moreover, the potential for employment and income generation for small and micro enterprises is also enormous.

As the Project has demonstrated over the past two years, with small inputs in training, technical assistance, promotion, and limited capital (through micro-credit revolving funds), nearly forty enterprises have been created, with another 30 small installer enterprises in operation, employing over 100 low income people. Again, from a gender point of view, women have benefited well through the Project both as recipients of

The Project carried out two intensive Kitchen Performance Tests (KPTs) in Awasa and training and technical assistance, and as beneficiaries for small enterprise development.

3.2 Household Trials Bahr Dar during the course of the Project. An Impact Assessment was also carried out with commercial injera bakers with a modified Mirte in Addis Ababa. These household trials demonstrated, first of all, that the Mirte performs as well in the household as in the laboratory. This has provided the Team with the confidence to actively promote the stove throughout the country. Second, these tests provided the Project with the basic data for reference in future work. The Bahr Dar KPT was important as it demonstrated that the scoria/red ash Mirte performed as well as the pumice-cement stove, and that it was positively accepted by households. The Awasa KPT demonstrated that the Mirte could function with a variety of commonly-used fuels such as crop residues.

One area of disappointment was the Mirte's performance with dung. Dung is widely used by a number of households throughout Ethiopia. In fact, it is a preferred fuel for most households during special occasions for baking special breads, particularly during the Easter feasts. The Mirte did not handle dung well. Combustion was a major problem, perhaps because of the surface area of dung. The Project Team could not find any simple means to modify the stove to accommDFIDte dung as a fuel. The only recommended action made by the Team was to mix dung with some woody biomass to improve combustion.

The prototype commercial Mirte proved very popular with commercial injera bakers. They continue to use the stove nearly one year after its introduction, and the demand for full production of this prototype is high amongst these bakers. The major issue with this stove is that of designing and fitting the chimney properly, as smoke evacuation is one of the most important features cited by the bakers. This is a priority area for future work, given the fact that commercial injera baking is such an important activity in Ethiopia. It is also growing in importance. Moreover, it is a major source of income for a large number of women, particularly women heads of households.

Each KPT and Impact Assessment was followed up by Project enumerators to gauge use and response to the stove after a period of at least six months. The results of these surveys were very encouraging, and also provided strategic guidance to the Project. They showed

that over 95% of all households continue to use the Mirte as their major or only stove for baking injera six months after stove purchase. They show the high number of women who buy the stove who are engaged in commercial injera baking (over 30% in Addis Ababa, over 50% in Bahr Dar and other smaller urban areas). This latter point provided the necessary information to push the Project Team to design a prototype commercial injera stove. This demonstrates clearly the importance of follow on and evaluation.

The Acceptability Surveys also showed continued fuel savings. They demonstrated that consumers like the stove, and used it properly. Issues such as cracking, deterioration of the fire inlet and other design points were noted by the Team. This led to improvements in the moulds and led to improved promotion to encourage consumers to use the Mirte in better ways. As follow up continued during the Project, it became apparent that households were using the Mirte better, and that the lifetime of the stove was extending with better use. Again, this demonstrated well the importance of follow up and evaluation in order to improve both the product's design, but also its use by consumers.

3.3 Producer Training

The Project directly trained 119 producers and installers, most of whom are still in the Mirte business. From the first of the Project, the Team introduced business skills training into all courses. Materials were produced in Amharic (see Annex 3) which set out clearly and simply, how to manage a business, how to improve marketing, the importance of promotion, among many other topics. The Project introduced micro-credit revolving funds for eligible businesses, in order to help develop their capital stock and to achieve small investments which would otherwise not have been made. The Team made business training a pre-requisite for receiving such financial assistance.

As time went on in the Project, producers and installers received further training in quality control, marketing, promotion, and business skills. This proved to be invaluable and explains why over 75% of all producers trained, and nearly 100% of all installers trained remained active businessmen by the end of the Project. This demonstrates not only the market demand, but the appropriateness of the training and the relevance of the Project's selection criteria for trainees.

3.4 Market Trials and Commercialisation

Over 15,00 Mirte stoves have been sold throughout Ethiopia at commercial, non-subsidised rates. Cumulative sales in Addis Ababa topped 9,500 during the Project, as Table 3.1 and Figure 3.1 show. This is very encouraging, given the fact that the Mirte stove is not an "off-the-shelf" item, but, instead must be installed in households by trained artisans. This makes commercialisation more difficult than selling portable stoves. Therefore, the Project has demonstrated that even a "fixed" biomass stove can be mass-commercialised, with

consistent quality assured.

Table 3.1

Recorded Mirte Sales from Addis Ababa Producers
July 1995 to March 1997

Quarter	Quarterly Sales	Cumulative Sales
Jul-Sep '94	151	151
Oct-Dec '94	176	327
Jan-Mar '95	106	433
Apr-Jun '95	155	588
Jul-Sep '95	342	930
Oct-Dec '95	364	1294
Jan-Mar '96	836	2130
Apr-Jun '96	709	2839
Jul-Sep '96	1221	4060
Oct-Dec '96	2593	6653
Jan-Mar '97	3236	9889
Total	9889	

Source: ESD and Cooking Efficiency Team

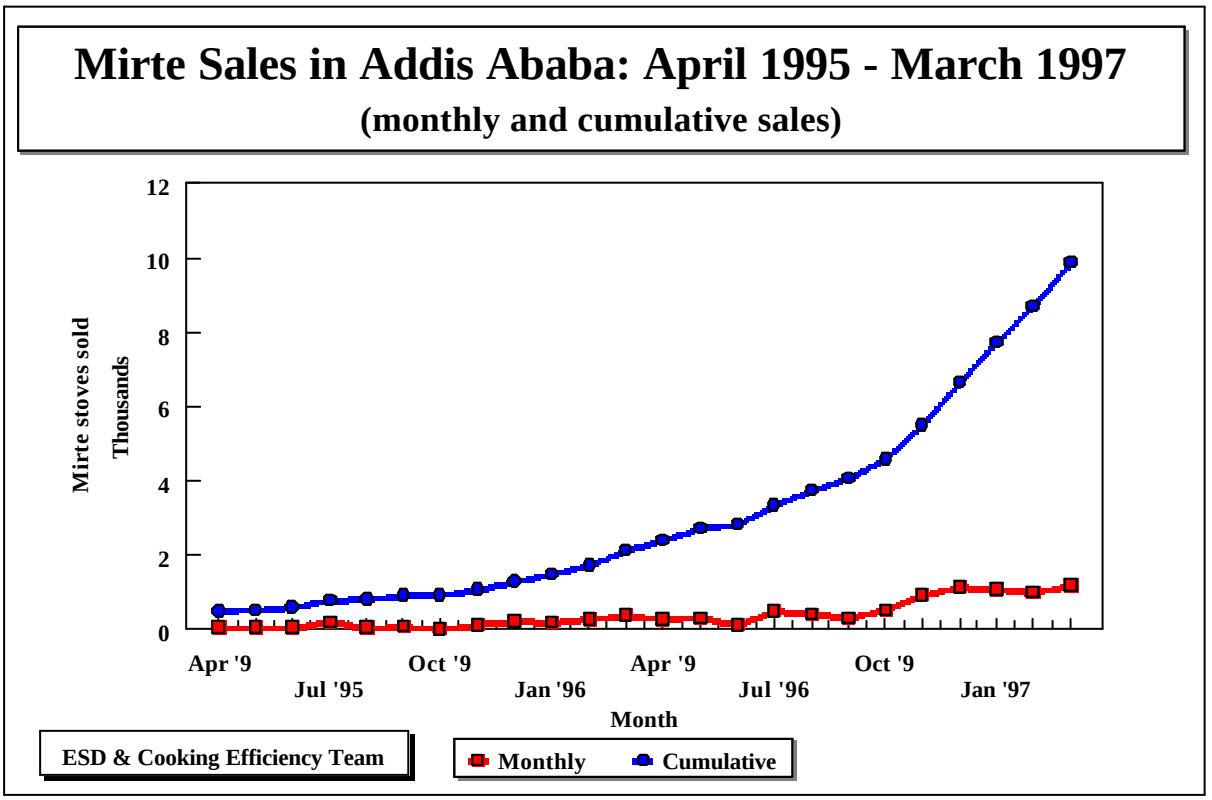

Figure 3.1: Addis Ababa Monthly and Cumulative Mirte Sales, April 1995 to March 1997

The Project has aired over 44 radio spots during the course of the Project. Over 122 market demonstrations were carried out in Addis Ababa, while a further 70 were carried out in Awasa, Bahr Dar, Shashamene, Nazareth, Hosanna, Gondar, Mekele and other smaller urban areas during the Project. Extensive training and assistance was provided to regional and local energy officials in six regions of Ethiopia during the Project. Television programmes highlighting the Mirte were shown nationalluy on several occasions. Regional authorities promoted the Mirte, and continue to promote the stove, through local radio and television.

3.5 Acceptability Tests

The Team carried out two acceptability tests in Addis Ababa, one in Awasa and one in Bahr Dar. Results show that over 95% of all households continue to use the Mirte six months after purchase. Households continue to be pleased with the Mirte due to its fuel-saving characteristics, because of its safety features protecting the cook from the fire, and because of the way the stove moves smoke away from the cook.

4. Implications of the Results or Findings for Achieving the Objectives of the Project

Household and market surveys, along with extensive follow up, have shown that the Mirte has achieved such rapid success so quickly due to three factors, ranked in the order most frequently cited by households and key market players:

- reduced smoke for cooks and households;
- reduced risks of burns and injuries caused by cooking on an open fire; and,
- reduced expenditures on fuel, or less time spent on collecting fuel.

Furthermore, the Mirte is viewed by many women as a "modern" device. This factor is extremely important to the stove's success. The perception that the Mirte is a modern and attractive improvement for household cooking is as important a feature in its market success as perhaps any feature. This factor is often forgotten in appropriate technology projects, particularly in the field of improved cookstoves.

4.1 Health

The most often-cited "advantage" of the Mirte is its health features. The results of two extensive household KPT surveys, one commercial injera bakers' impact assessment, and over 750 household acceptability follow up surveys (of households that bought the Mirte) showed that the most important feature of the stove was its reduced smoke. Traditional injera baking is extremely smoky. The primary reason traditional open fire injera baking is so inefficient is the incomplete combustion of fuel. The Mirte markedly improves fuel combustion during injera baking. Moreover, the stove's built-in chimney piece removes the smoke away from the cook. This has very important health benefits.

The importance of this feature was demonstrated by commercial injera bakers. These women often bake 12-15 hours per day, baking over 350 injeras during that period. The constant inhalation of smoke on a daily basis poses major health problems for these low-income women and their families. The commercial bakers who purchased the Mirte cited its "smoke free" characteristics as the most important feature of the stove, and accounts in large part for its widespread appeal to these women commercial bakers.

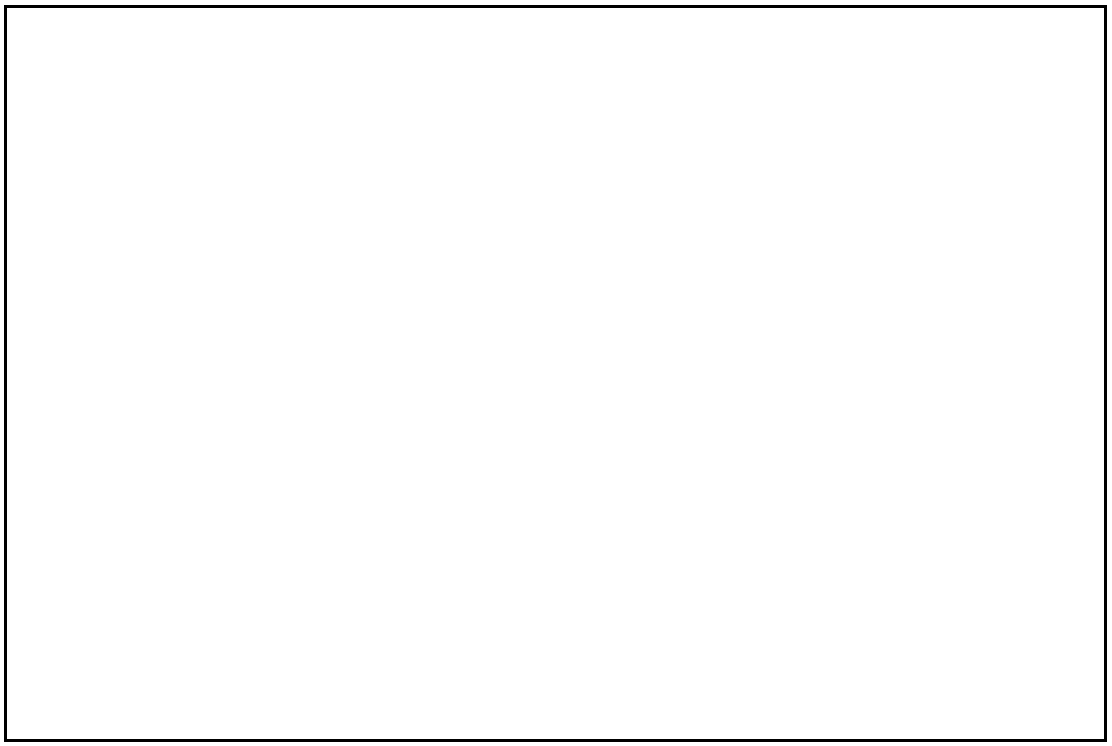

Figure 4.1: Commercial Injera Baker Using Mirte Improved Stove after One Year's Continuous Use

4.2 Safety

Traditional injera baking is dangerous. The flat plate "mtad" sits upon three stones. Fuel is fed under the mtad from several directions. Highly flammable fuels, such as leaves and twigs, are used by cooks to get the high heat necessary to cook injera quickly. This often results in sudden "flares" when the materials combust explosively. This causes burns which cause major injuries and scars for life.

The Mirte protects the cook almost entirely from the risk of rapid flash cooking. All but the fuel inlet is protected by the stove. It requires less fuel than traditional injera baking because the fuel is combusted steadily and efficiently. The Mirte builds up a constant high temperature which is sustained by feeding fuels slowly through the inlet. This dramatically reduces the risk of burns. This feature of the stove is cited as the second most important aspect of the Mirte in household and commercial injera baker interviews.

4.3 Energy Savings

Energy savings from the Mirte have been factored at a household (micro) and at a national (macro) level. At a household level, the stove saves the average household 8-10 kg of wood per week, which amounts to EB 5-8 per week, or EB 250 to EB 420 per annum (£25 to £40 per household in Sterling equivalent). This should be compared to an average

per capita income of less than £700 in Addis Ababa. Considering the average household size in urban Ethiopia is estimated at just under 5 persons per household, the Mirte results in savings in household expenditures between 8% and 13% per household per year.

The easiest measurement of national, or macro savings, is to calculate the wood and forestry savings of the stove. Each Mirte saves, on average, 400 kg of wood per household per year. Given the fact that there are currently over 15,000 Mirte stoves in regular use in Ethiopia, this indicates approximately 5 kg of wood per injera baking session for the average household. Most housewives bake injera twice a week. Thus, the Mirte saves the average household nearly 260 kg of wood a year, worth over £16. The stove sells for just under £3, thus paying for itself in almost two months. This is a significant savings for the average Ethiopian urban household. However, the Mirte saves commercial injera bakers over 3.5 tonnes of fuel wood per year, a savings of roughly £200 per year. This pays for the stove in days, and makes the sale of injera even more profitable for women bakers.

Beyond the fact that the Mirte saves households and commercial bakers money, and protects them from smoke and flames, it also saves Ethiopia scare forestry resources. With the current number of stoves in use, wood fuel savings of over 13,000 tonnes will be realised in 1997, equivalent to the sustained yield of over 2,500 hectares of forests. However, if sales continue at their current rate, over 20,000 Mirte stoves will be in use by the end of 1997, saving 75 tonnes of wood per day or approximately 25,000 tonnes per year.

4.4 Dissemination of Project Results

The Team developed a 45 minute video tape of the Mirte during the last six months of the Project. This tape, produced in Amharic and sub-titled in English, chronicles the history of the Mirte, sets out the advantages of the stove, interviews housewives and producers, and covers a range of issues concerning health, safety, fuel savings and "modern" cooking. This, accompanied by a twenty page Mirte summary, constitutes the Project's "Methodology Report". Twenty copies of the video were distributed to regional information bureaux, to NGOs and other involved with development, particularly women in development, and health and safety in Ethiopia.

Additionally, twenty copies of the tape were made and distributed internationally, including to the DFID, the ILO's Small Enterprise's Division in Geneva, the United Nations Environmental Programme in Risø in Denmark, the World Bank's Energy Sector Management Assistance Programme (ESMAP), to other World Bank offices, to the Directorate General for Development (DGVIII) of the European Commission, to members of the CREST Stoves Network, and to interested parties in Pakistan, India, Bangladesh, Guatemala, Honduras, South Africa, Uganda, Germany, Australia and the United States.

Copies of the methodology report were also sent to each of those organisations, and to over 25 interested parties internationally, including the World Aware Grants Committee, Shell International, the Richards Bay Company, among others. ESD has established a stoves link tied into the CREST Stove Resources directory, and promoted on its own Web page, that has presented technical results of the Project, photographs from the Project, and discussion of a range of issues resulting from the Project. ESD and its Ethiopian Team continue to promote discussion about the Mirte through these and other venues.

The Mirte represents an success that is of interest to a number of international parties. It shows that a high density biomass stove can be produced commercially, with no subsidies, and sold successfully through the informal artisanal sector. It demonstrates that pre-fabrication can be utilised to standardise thermal performance at a high level. The Mirte also shows how health and safety issues can be tackled by an improved stove, and how micro- and macro-environmental factors can be improved through an improved cookstove. This is of major interest to many people who are involved in development and in environmental issues.

Finally, the Mirte shows that an improved stove can achieve these multiple objectives while also employing people, and enhancing the opportunities for women engaged in business. In this case, the Mirte provides a venue for employment for women producers. More importantly, it improves the business environment for thousands of women commercial bakers. It thereby addresses important issues of social and economic equity.

5. Priority Tasks for Follow-Up

In general, the Team recommends that there needs to be:

- careful attention to developing strategies to commercialise the Mirte in rural (non-urban areas);
- a well-articulated strategy for working in rural areas that would focus on smaller urban areas first, then on rural areas and consumers with high disposable income, and then to other areas, with strong training, technical assistance, promotion and follow up support;
- major national promotion, particularly tied to promoting producers so consumers know the product and know where to get it;
- more producers trained in many areas of Ethiopia so that the stove can be produced all over the country;
- more attention paid to quality control;
- additional work needs to be provided to improve the stove's durability;
- more business skills training needs to be provided to strengthen the commercial capabilities of producers and installers;
- better liaison with local authorities;
- more attention to commercial injera bakers and their needs and requirements;
- more small-scale credit schemes, tied to improving business skills and business management at a micro-level;
- assistance to form and strengthen stove producers' associations;
- better sensitisation of local and national officials of the real issues of household energy, and the positive role that biomass plays in household economies particularly for low-income households who use stoves to earn incomes);
- money and personnel to carry up follow up to know how the stove is being used, to recommend improvements or changes in the stove, and to monitor the market;
- a small programme to ensure quality is maintained in the production and marketing of the stove;
- on-going testing and improvements of the stove; and,
- improved education of cooks on energy management, health and safety associated with cooking; and, perhaps most important for the long-term.

There are several priority areas for continued commercialisation of the Mirte. As has been shown, widespread commercialisation will make a major difference to save hundreds of thousands of tonnes of wood and thousands of hectares of Ethiopia's forest resource base. The most important next steps which need to be taken include:

- development of a viable, commercially acceptable commercial bakers' Mirte, which can be utilised under commercial circumstances (ie, 300-500 injeras baked per day for seven days a week, compared to 30 per session twice a week in the average household);

- national advertising on television and radio to promote the stove on a large-scale;
- more widespread familiarisation sessions with regional and local authorities, small and medium enterprise support organisations, and other organisations who assist women, small-scale businessmen, and the environment;
- training of artisans on the commercial production, sale and installation of the Mirte throughout Ethiopia;
- expanding the number of small revolving funds which provide capital (average loans of less than £50 per recipient, to more areas in Ethiopia;
- setting up innovative credit schemes (e.g., credit purchase) for large numbers of consumers such as were tested on a pilot basis by ESD (loans payable over 3-4 month period, at an average value of £200 per loan);
- providing on-going monitoring and evaluation of stove quality and production to maintain high standards, and to provide this feedback through public and national channels to improve consumer and producer awareness;
- dissemination of results nationally and internationally; and,
- international replication.

The Mirte's success is directly relevant in the region, particularly to Eritrea and the Sudan. The approach, and the success of the Mirte is very relevant to other countries in the developing world, and to other technologies. Disseminating these results is a high priority that ESD continues to undertake. The methodology report and the video shows that innovative approaches to household energy conservation can be commercially successful.

The history of successful stove programmes in the developing world is poor, and it has been particularly low with high mass stoves like the Mirte. The factors that have gone into the Mirte's success, and the success of its predecessor, the Lakech improved charcoal stove, are relevant to a wider international audience. These factors should continue to be carefully and fully documented to this audience in order to replicate the Mirte's success elsewhere.

6. Summary of Financial Expenditure

Table 6.1 provides the summary of financial expenditures for the Project between 1st April 1995 and 31st March 1997:

Date	Invoice No	Emoluments	Overheads	Travel	Subsistence	Consumables	Capital Items	Total
10-Aug-95	252	3134.00	2563.61					**5697.61**
05-Oct-95	262	7298.00	5970.00	2150.00	2470.00	120.00		**18008.00**
11-Jan-96	280	6860.00	5426.00	1700.00	4040.00	1147.80		**19173.80**
23-Mar-96	285	5747.60	4712.39	3400.00	4940.00	870.60	2453.00	**22123.59**
30-Sep-96	327	9400.00	7691.00	2400.00	3525.00	950.00		**23966.00**
13-Feb-97	384	9820.00	8035.00	2500.00	7540.00			**27895.00**
14-Mar-97	399	3250.00	2501.00			1633.00	86.00	**7470.00**
31-Mar-97	400	3334.00	2724.00	960.00	760.00	822.00		**8600.00**
Totals		**48843.60**	**39623.00**	**13110.00**	**23275.00**	**5543.40**	**2539.00**	**132934.00**

7. Name and signature of author of this progress report:

Mike Bess

Annex 1
Mirte Revolving Fund Criteria, Procedures & Forms

The Mirte Team developed a series of criteria for accessing the limited Project funds under the three revolving funds set up during the course of the Project. The maximum size of all three funds was EB 11,000 (approximately £ 1000) with the largest loan on the order of £200 at any one time. Committees were set up for each revolving fund.

Although the criteria and procedures appear arduous and cumbersome, they depended upon a good familiarity with the Project and the Project's objectives. Eleven credits were made over an 18 month period. Repayment within the lending period was 100%. At the end of the Project, approximately 16% of the Fund was outstanding, with repayments on schedule and coming due within two months of the Project's completion. The Team will continue to utilise the revolving funds, especially in areas of new Mirte production.

Mirte Project Criteria for Eligibility for Revolving Fund

1. The applicant must be known by the Project, or its participating institutions (e.g., regional energy bureaux) and be well-thought of by the Project, or its participating institutions.

2. It will be important if the applicant has worked with Project (e.g., as installer, as Lakech producer, as trainee, etc.) and Project has had good experience with applicant.

3. The applicant must have good reputation in the local area (e.g., with local community leaders, community, in general, etc.).

4. The applicant must demonstrate willingness to participate using Project funds on terms agreed by Project (ie, willingness to participate is not enough. The applicant must be willing to participate on the Projects negotiated terms; ie, sign the Projects Loan/Credit Agreement, below, and agree to its terms and conditions).

5. The applicant must agree to participate in Project-supported training (e.g., accounting, management, production, etc.) and utilise Project-supported or -provided assistance (e.g., technical assistance, management assistance, etc.) if and when the Project sets out such training or assistance.

6. The applicant must agree to conform with Project-set design, quality control, specifications, etc. with regard to the Mirte (ie, should agree not to make any modifications or changes without the Projects direct agreement).

7. The applicant must agree to maintain the Projects standards of production (e.g., quality control) and practices (e.g., good installation, good business practices).

8. The applicant must have the demonstrated ability to pay back funds within a specified time period.

Criteria for Using Revolving Fund Finance

1. The funds made available by the Project to the applicant must be used **only** for the purpose set out in the application.

2. The Application Form must be completed in full by all applicants for funds.

3. The application form must first be approved by the Commercialisation Team, and then approved by the majority of the members of the Revolving Fund Committee which will be established by the Project (in the case of places outside Addis Ababa, at least one of the members of this Revolving Fund Committee should be local, e.g., from the regional energy bureau). The recommended terms and conditions set out by the Revolving Fund Committee must then be written into the agreement and agreed upon by the applicant.

4. The Project Team should have worked with the applicant to draw up a **Business Plan** (which closely resembles the Application Form) which sets out:

   - how much funding is required;
   - what the funding will be utilised for;
   - how much the applicant will contribute towards the proposed funded activity (e.g., labour for building a shed, land for expansion of production facilities, etc.);
   - current income and expenditures from all activities (including present business and job, to determine current net income);
   - what other new inputs (labour, land, raw materials, etc.) will be necessary to make the investment financially viable;
   - how much expenditure the proposed activity will involve;
   - how much income the proposed activity will generate;
   - how much net income the proposed activity will generate (ie, all income from all activities less all expenditures);
   - whether or not net income will cover net costs, including servicing (paying back) the Project loan or credit;
   - how the applicant will track expenditures and revenues (e.g., bookkeeping system, accounts, etc.);
   - how long it will take to repay the Project loan/credit;
   - what kind of profit the applicant can expect;
   - what are the most likely risks associated with the investment (e.g., competition from other producers, difficulty in obtaining supplies of raw materials, changes in prices, other financial and person demands on the applicant, etc.); and,
   - how the applicant proposes to minimise those risks.

5. This business plan, in effect, is very similar to the Revolving Fund Questionnaire. It should be carefully reviewed by the Revolving Fund Committee. It should form the basis upon

which the Committee approves or disapproves the loan/credit, and recommends any additions, modifications, etc. which should be made to the loan/credit.

Mirte Stove Programme
Revolving Fund Application Form
and
Loan/Credit Agreement Form

1. Date of Application: _____
2. Name of Applicant: _____
3. Address of Applicant: _____

_____

_____

4. Brief Description of Applicant's Business: _____

_____

_____

_____

5. Brief Description of Intended Use of the Credit/Loan (or other assistance): _____

_____

_____

_____

_____

6. Brief Description of How the Credit/Loan (or other assistance) will result in Improved Mirte sales or commercialisation: _____

_____

_____

7. Type and Amount of Assistance Requested:

   7.1 **Loan:** _____

   7.2 Grant (specify why grant is needed): _____

   _____

   7.3 Technical Assistance: _____

   _____

   7.4 Other (specify): _____

   _____

8. State Conditions Upon Which Loan/Credit Will Be Repaid Including (attach "Business Plan" which sets this out in more detail):

   8.1 Repayment Period: _____

   8.2 Repayment Amount per Period (e.g., six equal monthly instalments, three small monthly payments then three larger monthly repayments, etc.): _____

   _____

   _____

   8.3 Gaurantees to be Provided (at a minimum this will be the equipment purchased under the loan, but could include some other form of guarantee,

   _____

such as written NGO, church, local government commitment, etc. to secure the credit/loan):

_____

_____

9. State the Applicant's Own Contribution to the Project for the Credit/Loan (e.g., land, labour, applicant's own matching funds, etc.) and how that will be measured an d monitored during the loan/credit period: _____

_____

_____

Approved Project Commercial Team: _____
Disapproved Project Commercial Team: _____
Recommendations by Project Commercial Team: _____

_____

_____

Approved Project Revolving Fund Committee: _____
Disapproved Project Revolving Fund Committee: _____
Recommendations by Project Revolving Fund Committee: _____

_____

_____

_____

_____

Loan, Credit and/or Other Assistance Agreement

Amount of Credit/Loan Approved: _____
Other Assistance Approved: _____
Terms and Conditions of Loan:

Time Period (duration) of Loan: _____

Number of Repayments and Amount per Repayment: _____

_____

Security Agreement by Applicant (specify each type and/or amount): _____

_____

_____

Applicant's Contribution to the Activity (specify all contributions, including labour, land, facilities, funds/financing, etc.): _____

_____

_____

I, the undersigned Applincant, agree to the Terms and Conditions set out for Use of this Revolving Fund assistance, and agree to abide by these Terms and Conditions during the period of Assistance:

Name	Signed	Date

Approved by Project manager (or designated representative): _____

Signed Date

Mirte
Business Plan Format for Revolving Fund Applications

To be completed by the relevant Mirte Team staff. This should be a short (no more than two pages) plan which will form the basis for completing the Application Form, which will be attached to the Application Form, and which will be reviewed by the Revolving Fund Committee.

1. How much funding is required:

2. What will the funding will be utilised for:

3. How much will the Applicant contribute towards the proposed funded activity (e.g., labour for building a shed, land for expansion of production facilities, etc.):

4. What is the Applicant's current income and expenditures from all activities (including present business and job, to determine current net income):

5. What other new inputs (labour, land, raw materials, etc.) will be necessary to make the investment financially viable:

6. How much expenditure will the proposed activity require:

7. How much **income** will the proposed activity generate:

8. How much **net income** will the proposed activity generate (ie, all income from all activities less all expenditures):

9. How much **profit** will the proposed activity generate (ie, all income from all activities, less all expenditures and depreciation/replacement of materials, equipment and capital):

10. Will net income cover net costs, including servicing (paying back) the Project loan or credit:

11. How will the applicant track expenditures and revenues (e.g., bookkeeping system,

accounts, etc.):

12. How long will it take the Applicant to repay the Project loan/credit:

13. What are the most likely risks associated with the investment (e.g., competition from other producers, difficulty in obtaining supplies of raw materials, changes in prices, other financial and person demands on the applicant, etc.):

14. How does the applicant propose to minimise those risks:

Annex 2
Basic Business for Small Entrepreneurs
Some Guidelines, Tips and Practices

The following notes, guidelines and case studies were prepared in English and in Amharic as training materials for Mirte producers. These notes were designed to help improve business, management and promotion skills of producers and installers. They proved very popular with producers during the Project, and the notes are now being translated into Tigrinya and Orominya.

Outline

1. What is Business?

2. What Defines Success?

3. How Does One Get Business?

4. How Does One Keep Business?

5. Basic Business Practices?
- **planning**
- **bookkeeping**
- **accounts**
- **marketing**
- **stocks & inventories**

6. What is the Optimal Size?

7. Business Do's and Don't's

8. Diversification

9. How Does One Expand Business?

- **the ? right time?**
- **the ? wrong time?**
- **key factors to remember**

10. Conclusions:
- **How to Add Value to Business (How to make more money!!!)**
- **How to Make Business More Fun & Easier**

1. What is Business?

- **Simply, business is a way to make a living, BUT**
- **There are many ways to make a living.....**
- **Business is a way to invest, produce, provide services...**
- **Business adds value to something**
- **Business involves taking a CONCEPT and making it WORK**
- **Business involves a CLIENT, CONSUMER or CUSTOMER and someone who SUPPLIES them with some good or service**
- **Business involves investing in personnel as a key capital asset, treating them as members of your team (otherwise, you'll lose them....)**
- **Business requires**
  - **organisation,**
  - **order,**
  - **clearly-defined relationships,**
  - **delivery on time,**
  - **providing quality goods and services**
  - **high quality, motivated staff**
  - **management**
  - **promotion**
  - **follow-up**
  - **adaptation**
  - **balance between new products/services and old**

2. What Defines 'Success'? (1)

- **'Success Breeds Success' : 'There's Nothing Like Success to Make You Succeed'**
- **Success means taking a good, a service, a concept and making it work, making it make money, developing a market for it**
- **Success means not ONCE, but CONTINUOUSLY providing goods and services Clients and Consumers Want**
- **Success means REPEAT Business**
- **Success Means Happy Clients**
- **Success Means Competitors Try to Copy You ('Copying Is The Highest Form of Flattery')**
- **Success Means Never Staying Idle**
- **Success Involves Always Staying Tuned To Your Consumers and Adapting To their Needs and Wants**
- **Success Involves Knowing How the Market Develops and Changes, and then Changing to Meet Those Market Changes**

2. What Defines 'Success'? (2)

- **Success Means Organising and Maintaining High Quality:**
  - **Production,**
  - **Work,**
  - **Personnel & Personnel Development**
  - **Staff Motivation**
  - **Books,**
  - **Accounts,**
  - **Advertising,**
  - **Marketing,**
  - **Promotion,**
  - **Follow-Up in a Systematic, Business-Like Way**
- **Success Means Never Taking Anything for Granted**

3. How Does One Get Business?

- **Business Never Arrives, Business Is Always Sought and Fought For; Competition is Always There**
- **Business Comes from Having a Good Product or Service, and Making Consumers Feel They Are Getting Good Value**
- **Business Always Come When the Business Person Convinces the Consumer that they (the Consumer) are 'Queen' or 'King'**
- **Business Comes from Always Being On Top of the Market; from Always Understanding Consumers**
- **Business Is Kept By Never Taking the Market or Consumers for Granted**
- **Business Comes from Keeping High Quality**
- **Business Comes from Reliability, Dependability**
- **Business Comes from Keeping Promises**
- **Business Comes from Always Being Hungry, Never Getting 'Fat'**

4. How Does One Keep Business?

Get New Clients
But Keep the Old
One is *Silver*
But
the Other is *Gold*!!!

- **Repeat business is the business person's main source.**
- **Once you get a customer, keep her or him.**
- **Never take your customer for granted**
- **Always treat your customer like a new, good friend**
- **Always treat your old customers like they are NUMBER 1, not NUMBER 2!**
- **Always treat your personnel as important assets; make their welfare and advancement yours!**
- **Keep quality at the highest possible standard**
- **Never stop trying to improve**
- **Always make your customers (and your competitors!) think you are always trying something new *FOR THEIR BENEFIT***
- **Keep Business Premises Neat and Tidy**
- **Always Keep Good Contact with Your Customers; Know What They Want; Make Them Feel You Are Doing This For Them (and yourself!)**
- **Always be on the Lookout for New Things BUT, Make A Balance Between the Old and the New; Don't Drop Your OLD RELIABLES!!**
- **Remember, the Customer is Queen or King!**
- **Always Follow the Market; Never Be Undercut by the Competition; Stay Competitive**

- **Keep Quality and Service as High As Possible**
- **Never Take Competition for Granted; Always Know Your Competition**
- **Always Understand the Market and Respond with Quality, New Products and Promotion**
- **Always Treat Your Staff Like They Are As Important As Your Consumers**
- **Continue to Invest in Staff, Capital, Marketing and Promotion - Never Rest**

5. Basic Business Practices? (1)

Key Elements for Businesses

- ***Planning:*** **Think to the future. Plan for the high and low sales times. Understand your own needs so that you can match expenditures with sales, build up stocks for high demand, and have cash, other reserves for periods of low sales.**

- ***Bookkeeping:*** **Keep good books that set out all your inputs, your personnel, your accounts, your sales, your expenditures, your stocks, your customers, your markets, the values of your assets and your liabilities.**

- ***Accounts:*** **Keep good accounts on expenditures, sales, stocks, inventories, debts and liabilities.**

- ***Market Assessment & Monitoring:*** **Know your market. Keep track of changes in consumer demand and markets. Understand your competition. Monitor your consumers for how they feel about your products. Know how your products and services compete against other competitors. Never let the competition catch up on you in the market place.**

5. Basic Business Practices? (2)

- ***Marketing & Promotion:*** **Always stay on top of the market. Always put a good amount into marketing. Remember, the most effective marketing is to keep consumers happy, coming back for more, telling their friends and families. Don't invest more in advertising than you need. Balance advertising with HAPPY CLIENTS!**

- ***Personnel:*** **Invest in Personnel. Your Staff are your most Important Asset. Train Them. Given them new skills. Give them incentives. Give them the chance to get ahead. Listen to their ideas. Consider them as your FAMILY. Never take your staff for granted or you will lose them. *YOUR PERSONNEL LOSS IS YOUR COMPETITION'S GAIN.***

- ***Personnel Management:*** **Treat Staff like equals. Meet frequently. Give people the chance to share ideas. Let people go where they would like, BUT, make sure you work as a TEAM, not a set of INDIVIDUALS. Teamwork advances people's careers while also advancing your business!**

5. Basic Business Practices? (3)

- ***Competition:*** **Never underestimate or overestimate your competitors. It's a tough world out there, but live with competition. Friendly competition is good for EVERYONE. Know how your competitors work. Understand why your competitors are in the business and why they succeed. Always stay at least one step ahead of your competition. Don't always MOCK or COPY your competitors.**

- ***Development:*** **Always consider the importance of developing and adapting products and services to the market, BUT, DON'T CHANGE FOR THE SAKE OF CHANGE. Some of the most successful products have been around for a long time. Learn what consumers want, and ADAPT your products to meet demand, BUT do it in a professional way.**

- ***Stocks & Inventories:*** **Know what you have in stock. Never get caught short-handed. When you are out of a product, your consumer will go to your competitors. BUT, inventories and stocks cost money (storage, handling, etc.). So, know the market and stock accordingly!**

6. What is the Optimal Size?

- **The Right Size fits your level of production and services to the Market and Demand**
- **Don't get bigger than the Market**
- **Don't let the Market get Bigger than you**
- **Size is a matter of personnel, production, market outlets, investment, capital, etc.**
- **Always be prepared to keep size slightly bigger than current demand and always work to make your size PAY for Itself**

7. Business Do's and Don't's (1)

Do's

- **Always Treat Your Customers Like They Are The Most Important Thing In Life for You**
- **Always Treat Your Staff As Equals, as Real Partners in Business**
- **Always Keep An Eye On Competition**
- **Always Understand the Market**
- **Always Keep Yourself and Your Business in Professional Shape**
- **Give Good Service and Good Products and the Customers Will Come Back for More**
- **Market Sensibly, and Remember Repeat Business is the Best Market, and Word of Mouth the Most Effective Investment in Marketing**
- **Keep Good Accounts and Books So That You Always Know Where You Are**
- **Make Credit Work for You (your return on investment should always be higher than the rate at which you borrow)**

7. Business Do's and Don't's (2)

Don't's

- **Never Take Your Customers for Granted**
- **Never Underestimate Your Competition**
- **Never Take Your Staff for Granted**
- **Never Develop New Products Just for the Sake of It**
- **Never Develop Markets Unless You're Sure They Will Pay**
- **Never Build Up Stocks & Inventories More Than You Need**
- **Never Let Your Bookkeeping and Accounts Take Second Place**
- **Never Let Your Premises Look Less Professional Than You Are**

8. Diversification

- **Diversification should only take place to meet consumer demand**
- **Expanding your product line should not be an end in itself**
- **Too many products can be worse for a business than too few**
- **Diversification should always make your product and services better, never worse**
- **Think carefully before you diversify; make sure diversification is what your customers want AND is something you are able to do**
- **Never diversify if it will make your products poorer, or weaken your markets**
- **Diversification should be natural and should fit into the kind of goods you already produce and services you already provide**

9. Expanding Business

- ***Choose the Right Time:*** **The right time is when your customer base is growing and you have sufficient demand to warrant new investment in personnel, stocks, new premises, and when this all adds to your customer services and competitiveness;**

- ***Avoid the Wrong Time:*** **The wrong time is when business is slack, when you think it might be a good idea to move to new markets without having first tested them, without demonstrated demand. The wrong time is when you are having trouble collecting debts, having marketing and customer relations problems, and when you are having personnel problems;**

- ***Key Factors to Remember:***
  - **Never expand for expansion's sake**
  - **Never expand until you are sure you have a good market**
  - **Plan your expansion; don't jump into it**
  - **Make sure you can finance your expansion, that you have the personnel to carry out the expansion**

10. Conclusions

- ***How to Add Value to Business (How to make more money!!!):*** **People who enjoy their work are people who will succeed when they apply themselves and follow the basic business rules. Invest in people, both your own staff and in your consumers. Invest in product improvement, but focus on quality not necessarily ? new? products. Do things well. Give high quality and you will get high value. High value products sell for more than low quality. Always work hard to deliver higher quality goods and services than your competition!**

- ***How to Make Business More Fun & Easier:*** **Having fun is a key to success in business. Successful business people enjoy their work. They enjoy making customers happy. They feel good when they get it right, understand their clients, and sell goods and services that people want. They enjoy learning about the market, and learning what works and what doesn't.**

Annex 3
Mirte Commercialisation Training Notes in Amharic

Annex 3 provides an example of the training notes that were translated from the English for training producers on improved business skills. These notes have been widely used, and have been provided to all producers as part of their on-going training.

Additionally, this Annex includes copies, in Amharic, of completed forms and reviews for the Revolving Funds. These correspond the forms set out in Annex 1 of this report. The attached forms are one set of eleven completed by revolving fund credit recipients during the life of the DFID Mirte Project.