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FUEL-EFFICIENT STOVE PROGRAMS IN HUMANITARIAN SETTINGS:

An Implementer's Toolkit

TOOLS

CONTACTS

RESOURCES

PRACTICAL TIPS

FUEL-EFFICIENT STOVE PROGRAMS IN HUMANITARIAN SETTINGS:

AN IMPLEMENTER'S TOOLKIT

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Table of Contents

TOOLS AND RESOURCES

ACRONYMS

ARECOP	Asia Regional Cookstove Program
CCT	Controlled Cooking Test
ERMS	Economic Recovery and Market Systems
ERTC	Energy Research and Training Center
FES	Fuel-efficient Stove(s)
GBV	Gender-based Violence
GTZ	German Society for Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit)
IASC	UN Inter-Agency Standing Committee
IDP	Internally Displaced Persons
KPT	Kitchen Performance Test
LPG	Liquefied Petroleum Gas
NGO	Non-governmental Organization
OFDA	Office of U.S. Foreign Disaster Assistance (USAID)
PCIA	Partnership for Clean Indoor Air
PM	Particulate Matter
SAFE	Safe Access to Firewood and Alternative Energy in Humanitarian Settings
USAID	United States Agency for International Development
VAT	Value-Added Tax
WBT	Water Boiling Test

INTRODUCTION

Humanitarian organizations are becoming increasingly concerned about energy issues in communities, camps, or settlements where internally displaced persons (IDPs) or refugees are settled temporarily. At a minimum, all displaced people require fuel to cook, and the manner in which fuel is obtained and used can have significant impacts on displaced populations, host communities, and the surrounding natural environment.

Firewood and charcoal always are in high demand for traditional methods of cooking. Fuel-efficient stoves (FES) can have many positive impacts in a camp, settlement, or other IDP setting. These stoves can help save energy, reduce the time and burden of collecting firewood, and limit the associated exposure for collectors to physical attack and/or gender-based violence. The production and sale of FES can provide important income-generating opportunities for local manufacturers and sellers. Because traditional open fires can be very unsafe in crowded camp or settlement conditions, FES can reduce the risks of uncontrolled fires, as well as burns suffered by cooks and children. FES also have the potential to reduce the impact of health problems related to smoke inhalation. In many cases, cutting trees, shrubs, and roots for fuel can lead to the depletion of forests and environmental degradation in areas that host transient populations. Fuel-saving stoves can slow the degradation and help ease tensions over the use of, and access to, these natural resources.

There is much debate over what types and styles of stoves are the most fuel-efficient and user-friendly, and whether a particular stove will be useful to displaced populations. The purpose of this Toolkit is to help humanitarian organizations determine if an FES program is feasible and appropriate for a given setting, and if so, how to design and implement an

effective program for wood-burning stoves. These guidelines and associated tools represent standard good practices approved by the United States Agency for International Development/Office of U.S. Foreign Disaster Assistance (USAID/OFDA) for FES programs in immediate and protracted humanitarian contexts.

HOW TO USE THE TOOLKIT

This Toolkit is designed to take you and your organization through a step-by-step process of assessment, planning, implementation, and monitoring and evaluation of a proposed activity. While these guidelines focus primarily on wood-burning stoves, OFDA also will consider funding applications for stoves that utilize other fuels. A similarly thorough needs assessment and justification analysis will be required for those programs as well.

The Toolkit contains twelve steps. Each step includes an introduction, explanation of the task(s) to be conducted, tools to help you carry out the task(s), and information on additional resources. Each step is color-coded for ease of use. In addition, data log sheets for all surveys and testing protocols are provided on an accompanying flash drive. You therefore have the ability to reproduce and modify the forms as necessary for your particular project.

While this Toolkit has been developed to be as comprehensive as possible, it is not possible to account for all possible circumstances or situations. This Toolkit provides the framework to make informed decisions, but you must also apply your knowledge about the unique needs, experiences, and preferences of your target beneficiaries and the natural and political environments where you intend to work. Moreover, the fields of stove design and testing methodologies are dynamic, and USAID priorities and indicators will change over time. Therefore, you should refer to the USAID/OFDA *Guidelines for Unsolicited Proposals and Reporting* to determine if there are any relevant revisions or updates before submitting your proposal for funding.

The OFDA *Guidelines* can be found at:
http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/resources/pdf/updated_guidelines_unsolicited_proposals_reporting.pdf.

The twelve steps contained in the Toolkit are:

Step 1 Determining if an FES Program is Needed and Feasible
Step 2 Developing a Concept Paper
Step 3 Designing Your FES Program: Collecting Background Information
Step 4 Designing Your FES Program: Interpreting the Survey Data
Step 5 Designing Your FES Program: Selecting Your FES Model
Step 6 Designing Your FES Program: Staffing Your FES Program
Step 7 Designing Your FES Program: Anticipating Common Problems
Step 8 Preparing a Full Proposal
Step 9 Implementing Your FES Program: The Pilot Phase
Step 10 Implementing Your FES Program: Stove Dissemination and End-user Training
Step 11 Monitoring, Testing, and Reporting
Step 12 Putting it All Together: Ten Tips for Successful FES Programs

STEP 1

DETERMINING IF AN FES PROGRAM IS NEEDED AND FEASIBLE

The first step of this Toolkit will help you decide if an FES program is appropriate for your specific area and situation.

MINIMUM CRITERIA USED TO DECIDE IF AN FES PROGRAM IS NEEDED AND FEASIBLE

During the emergency phase of a natural disaster or complex emergency, affected populations at a minimum need water, shelter, protection, food, and the means to cook food. If the disaster response period is expected to last a minimum of 12 months, the introduction of a fuel-efficient stove program may be appropriate. **OFDA believes that a targeted FES program cannot successfully be designed and implemented in less than 12 months, and will not consider FES activities for shorter response periods unless the proposed activity builds upon stove programs already in place. However, this does NOT mean that an energy strategy is not needed in short-term disaster or emergency situations.** For short-term responses, you are encouraged to collaborate with other groups and the disaster-affected population to help develop a household fuel strategy. Relevant organizations working on short-term disaster response include the Safe Access to Firewood and Alternative Energy in Humanitarian Settings (SAFE) taskforce.[1]

1 The Inter-agency Standing Committee Task Force on Safe Access to Firewood and Alternative Energy in Humanitarian Settings (www.fuelnetwork.org) has guidance on how to develop a fuel strategy for refugees and internally displaced persons. The Task Force guidance is designed for both acute and protracted response, recognizing that the needs and capacities of organizations working in these contexts can be different from those addressing traditional development objectives.

If the disaster or emergency response that you are working on is expected to last at least 12 months, you must then answer the following questions to determine whether an FES program is appropriate:

- Is the local fuel supply limited?
- Is access to fuel limited?
- Are the cook stoves or methods currently in use to cook energy-inefficient?
- Are fuel collectors at risk of abuse, attack, or exploitation?

If the answer to one or more of these questions is "YES," the emergency warrants consideration of an FES program. You can proceed to Step 2.

STEP 2

DEVELOPING A CONCEPT PAPER

Now that you have determined that an FES program could be useful in the environment where you are working, the next step is to provide information about your proposed FES activities in a concept paper to OFDA. The FES activities can be incorporated into a larger program under the sectors of *Health, Economic Recovery and Market Systems*, or *Protection*, or they can be submitted as the sole activity (a stand-alone program) under one or several of those sector(s). Submission of the concept paper for OFDA review is a first step toward submitting a full proposal. Basic information on the purpose and content of concept papers can be found in the OFDA *Guidelines for Unsolicited Proposals and Reporting*: http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/resources/pdf/updated_guidelines_unsolicited_proposals_reporting.pdf

Please note that the guidance provided in this Toolkit on the development of a concept paper and proposal are specific to OFDA; other donors may have different procedures, requirements, and criteria for application and review of FES-related proposals. However, the need to address the feasibility of a given project and its staffing needs will be common to all programs, independent of other donor requirements. Moreover, the tools and resources provided in this Toolkit should be useful for any FES program in humanitarian situations.

In addition to supplying the background information specified in the OFDA *Guidelines*, you must include stove program-specific information in your concept paper. This information can be obtained through a rapid site assessment; the assessment questions are listed below. Additional details and a user-ready version can be found in the associated tool in Step 2 Tool A.

1. What are the objectives of the proposed program?
2. Under which OFDA sector and sub-sector will your FES program be conducted?
3. What is the size of the population targeted for the FES program?
4. What types of risks (economic, physical, etc.)—if any—do fuel gatherers face?

5. What type(s) of stove(s) is being used currently by the targeted population?
6. What types of fuel currently are being used by the targeted population?
7. What are the limitations to fuel access and/or supply?

CHOOSING AN OBJECTIVE AND CORRESPONDING OFDA SECTOR AND SUB-SECTOR

FES programs may seek to address a wide variety of objectives. At present, OFDA has not established a humanitarian sector devoted uniquely to stoves and household energy needs, although this may change in the future. For now, FES activities must be incorporated as activities within an existing OFDA sector. Listed below are common objectives for FES programs, and the appropriate OFDA sector under which you should place the program/activity. Stand-alone programs can be submitted under more than one sector according to the objectives you choose, but if your program is funded, you will be required to report progress according to indicators for each chosen sub-sector. Suggested FES indicators as well as monitoring and evaluation guidance are included in Step 11.

Objective: Generation of income or employment

The manufacturing and sale of stoves or selling stove parts/materials (including fuel) can generate income for individuals, households, and communities. FES can also be used to cook food/meals to sell. Determining whether a local income generation/employment objective is being met involves identifying who is selling what, how often, to whom, and for how much money. An additional layer of analysis can be added to determine what the proceeds were used to buy and how individuals or households benefitted from the purchase. This objective is comparatively easy to measure and monitor.

▲ CHOOSE OFDA SECTOR: *Economic Recovery and Market Systems (ERMS), and* ERMS SUB-SECTOR: *Economic Asset Development; Economic Asset Restoration; Micro-credit, or Temporary Employment, according to the type of activity you are proposing.*

Objective: Reduced risk or incidence of gender-based violence

By reducing the amount of fuel households need to cook their food, FES can, in theory, result in a reduction in fuel-gathering trips undertaken by household members—usually women and children—thus reducing their potential exposure to violence and abuse. To report on this objective, you will need to monitor the number of trips and amount of fuel your beneficiaries are collecting. Because it can be difficult and time-consuming to demonstrate that the FES program directly results in reduced risks of harm, exploitation, and abuse to the targeted population, OFDA will accept the indirect data on frequency of fuel gathering as a proxy.

▲ CHOOSE OFDA SECTOR: *Protection, and*
PROTECTION SUB-SECTOR: *Gender-based Violence (GBV) Prevention and Response, or Child Protection, depending on the type of activity you are proposing.*

Objective: Reduced risk of house fires and burns

All fuel-efficient stoves contain and control fire in some manner. This containment can help reduce the risk of materials catching fire from open flames, fires started by cinders or embers, and burns from open flames. Demonstrating this correlation involves tracking the number and cause of fires in communities before FES were introduced, compared to the number and cause of these incidents after the introduction of the stoves. Similarly, a survey of burns and burn victims can help determine if the FES reduced the incidence. Note that in both cases, information gathered before the program started will in most instances be recall data which must be collected and analyzed carefully.

▲ CHOOSE OFDA SECTOR: *Protection, and*
PROTECTION SUB-SECTOR: *Child Protection*
or
▲ CHOOSE OFDA SECTOR: *Health, and*
HEALTH SUB-SECTOR: *Health Education/Behavior Change*

Objective: Improved health

Stoves that are more efficient or are designed to reduce emissions, in principle, could help reduce the negative health impacts of inhaling smoke. However, few organizations will have the time, resources, or expertise to undertake a full health impact study in a disaster context. OFDA therefore is willing to accept reduction in exposure to particulate matter as a proxy for improved health, but even in this case, implementers will have to engage OFDA-approved experts to conduct baseline and project impact studies.

▲ CHOOSE OFDA SECTOR: *Health, and*
HEALTH SUB-SECTOR: *Health Systems and General Health, or Health Education/Behavior Change, or Non-communicable Disease, according to the type of activity you are proposing.*

Objective: Environmental damage mitigation

Reducing the amount of cooking fuel needed by households could contribute to reduced deforestation and environmental damage. However, currently there is no OFDA sector devoted uniquely to environmental objectives. Therefore, you must choose *Health, Protection, or Economy and Market Systems* as the main sector in which you will work, and select one of the sub-sectors listed above. If you wish to flag an environmental aspect of your program, you should select the OFDA Keywords "Environmental Management" and/or "Natural Resource Management" under the Keyword section in your full proposal.

STEP 2

TOOLS & RESOURCES

> Step 2 Tool A: Rapid Site Assessment

TOOL A: **Rapid Site Assessment**

If you are planning to seek funding from USAID/OFDA, you will need to submit a concept paper for OFDA review prior to submitting a full proposal. The concept paper should include background information, objectives, and stove-specific information. The following rapid site assessment will help you gather the information you will need to draft your concept paper. An electronic version of this survey is provided on the flash drive.

Please note that this guidance is specific to OFDA; other donors may have different procedures, requirements, and criteria for the application and review of FES concept papers.

1) What is the primary objective of the proposed program?
(There may be several if the FES program is the only activity [stand-alone] in the proposal).

- Generation of income or employment
- Reduced risk or incidence of gender-based violence
- Reduced risk of burns and house fires
- Improved health

2) Under which OFDA sector or sub-sector will your FES program be conducted? *(If the FES program is part of a larger, multi-sector proposal, you should choose one sector according to the main objective of your program. If the FES program is the only activity in the proposal, then more than one sector can be chosen according to whether you have multiple primary objectives. Please contact an OFDA representative if you have questions about your choice of sector[s]).*

SECTOR: Economic Recovery and Market Systems

Sub-sector:
a) Economic Asset Development
b) Economic Asset Restoration
c) Micro-credit
d) Temporary Employment

SECTOR: Protection

Sub-sector: a) Gender-based Violence Prevention and Response
b) Child Protection

SECTOR: Health

Sub-sector: a) Health Systems and General Health
b) Health Education/Behavior Change
c) Non-communicable Disease

3) What is the size of the population targeted for the FES program?

_____

4) What types of risks (economic, physical, etc.) – if any – do fuel gatherers face? *(Check all that apply)*

- ❑ High price of fuel
- ❑ Shortages of fuel
- ❑ Seasonal fluctuation in fuel availability
- ❑ Must travel long distances to collect fuel
- ❑ Competition between groups for access to fuel
- ❑ Problems with security when obtaining fuel (*specify*)_____
- ❑ Other _____

5) What types of stoves are currently being used by the targeted population? (*List all types below; add lines if necessary. If you don't know the name of the stove, describe it based on the material it is made of, shape, and size.*)

Type 1 _____
Type 2 _____
Type 3 _____
Type 4 _____

_____

_____

6) What types of fuel are currently being used by the targeted population?
(Check all that apply)

- ❑ Charcoal
- ❑ Firewood
- ❑ Dung
- ❑ Biomass (agriculture waste, shrubs, roots)
- ❑ Liquefied petroleum gas (LPG)
- ❑ Kerosene
- ❑ Other (*specify*) _____

7) What (if any) are the limitations to fuel access and/or supply?

Please describe:

_____

_____

_____

_____

_____

_____

_____

_____

STEP 3

DESIGNING YOUR FES PROGRAM:

COLLECTING BACKGROUND INFORMATION

If OFDA recommends development of a proposal based on your concept paper, you can use the tools in this step to begin collecting the detailed information necessary to submit a full proposal. Your organization is expected to undertake a full site assessment with your own funding as an indication of your commitment to the FES program. The assessment consists of two important activities: (1) gathering site-specific contextual information using a site survey; and (2) gathering information about households in your target population using a household survey. In Step 8, you will find guidance on how to organize the information you have gathered into the corresponding sections of a full proposal, per the OFDA *Guidelines*. A copy of the surveys and findings should be attached as an appendix to your FES program proposal.

Both survey tools will help you collect information about the community/camp, the potential beneficiaries, the local authorities, and other stove programs operating in the camp or settlement. This information will help you to decide what sort of intervention will be most appropriate, and identify logistical concerns and cost factors that will affect the design of your FES program.

THE SITE SURVEY

The **site survey** is designed to gather information that will help you understand the existing political and economic structures and institutions within the camp or settlement, and how your program will fit within these structures. The survey asks you to obtain basic information on the site of the intended program, including logistical information, the size and management of the camp/settlement, relationships within the camp/settlement, and other factors that might affect the outcome of your project.

The site survey is not a formal survey. The information can be obtained from your existing knowledge of the camp/settlement and supplemented by additional information gathering

and interviews. The interviews will be conducted primarily with formal and informal leaders at the site, such as women's and youth group leaders, people using or selling stoves or fuel in the local market, and leaders of community-based organizations or groups within the camp/settlement. It is important to capture the perceptions of both men and women leaders. All of the information gathered in the site survey will be used to tailor the household survey and design the survey implementation methodology.

The amount of time that it will take to complete the site survey will depend on your familiarity with the camp or settlement. You may already know the answers to many of the questions, such as the population of the site or the average household size. For other questions that relate more specifically to stove use or cooking practices, you may need to consult with residents and/or other donors working in the camp/settlement. The site survey can be found in Step 3 Tool A.

THE HOUSEHOLD SURVEY

The **household survey** will require more time and preparation to implement, but will lead to a wealth of information that will help you design your FES project. Once you have completed the site survey, you should review the questions in the household survey in Step 3 Tool B to determine whether any changes need to be made. For example, if the site survey revealed that only one or two stove types are present in the camp/settlement, the questions pertaining to stove type can be modified.

The household survey is a formal survey that needs to be conducted in a rigorous manner so that the survey results capture the diversity within the camp/settlement. It is important to select the survey sample carefully to get the most representative picture of the intended target and to reduce the possibility of bias. Ideally, respondents should be chosen according to **random sample** methodology (see Step 11 Tool D) to ensure that the population sampled is representative of the households that you plan to target for your FES program. In some disaster contexts, however, you may not have adequate time

and/or resources to apply random sampling techniques. In those instances you should use **purposeful sampling** techniques, described in Step 3 Tool B (the introduction to the household survey).

The household survey should take approximately 30 minutes per interview, based on the model survey included in this Toolkit. The model survey will need to be pilot-tested in the field before full implementation can begin. It is important that the survey be translated into the local language(s) to ensure that all questions are understood, and that surveyors be trained on implementation before they are sent out to conduct the survey. Surveyors must themselves be able to speak in the language of the target beneficiaries to get the best results, rather than rely on translators. More detailed instructions on survey implementation are contained in Step 3 Tool B.

STEP 3

TOOLS & RESOURCES

> Step 3 Tool A: Site Survey Template

> Step 3 Tool B: Household Survey Template

TOOL A: **Site Survey Template**

GATHERING BACKGROUND INFORMATION ON THE CAMP OR SETTLEMENT

The site survey is used to obtain basic information about the site's population, characteristics, and leadership structures. The information can be gathered from multiple sources, including your own on-site records, other organizations' documentation, and selected interviews with people in the camps/settlements. (Because you will be conducting a household survey with residents from your site, you will want to focus on interviewing local leaders for the site survey.) We recommend that you complete the survey section by section; different staff members may be assigned different sections, or one person may be assigned responsibility for the entire survey. You are advised to speak first with the camp officials/local leaders and then expand to other formal and informal leaders, including, for instance, a women's/men's group leader, some sellers in the local market or stalls, leader(s) of a community-based organization, and leaders (male and female) of non-displaced communities. This information should be gathered following the Rapid Site Assessment, submission of your concept paper, and an invitation from OFDA to submit a full proposal.

Step 4 will help you to review the information you have gathered in a way that will inform your program design and technology selection.

THE SITE SPECIFICS *(an electronic version of the survey is provided on the flash drive)*

The information gathered from this section will give you an idea of the size of the community/camp/settlement you plan to work in, how long the targeted population is expected to stay in this location, and shelter types and weather conditions that may affect the FES program design. This information will help you plan the size of the intervention and identify security and logistical concerns that may affect stove selection. Shelter types and weather conditions will help determine which stove models may be appropriate for local conditions. The stability and longevity of the camp/settlement have implications for production and dissemination strategies, as well as for monitoring the performance/impact of your activities.

1) Population of the community/camp/settlement

a. Total population _____
b. Number of households _____
c. Average size of households _____

2) How long has this community/settlement existed in this location?

_____

a. Is the population *(Check one)*: ❑ STABLE ❑ INCREASING ❑ DECREASING

3) To what extent are people allowed to move freely beyond the perimeters of the camp? *(Check all that apply)*

- ❑ Free movement
- ❑ Very little movement outside the camp
- ❑ Other *(clarify)* _____

4) Are the displaced persons living in a camp (blocks) or within a local community? _____

5) What types of shelter is the population living in? *(Check all that apply)*

- ❑ a. Plastic sheeting
- ❑ b. Canvas/tent
- ❑ c. Biomass (thatch, wood, straw)
- ❑ d. Mud/mud wattle
- ❑ e. Brick or concrete
- ❑ f. Combination (*list materials*) _____
- ❑ g. Other_____

6) How densely packed are the structures? (*Check ONE that most closely describes the density*)

- ❑ a. Up against (touching) each other
- ❑ b. Approximately one to two meters apart
- ❑ c. More than three meters apart
- ❑ d. No uniform pattern of settlement – some structures are very near to one another, others very far

7) Is there a season of heavy rain?

a. If so, when (which months) does it occur? _____

b. Is there a cold season? (Note: this may coincide with the rainy season)

i. *If so, when?* _____

ii. *Is the fire/stove commonly used for heating?* ❑ YES ❑ NO

LOCAL LOGISTICS

Knowledge of local transportation options and obstacles can help provide information on access to fuel, as well as how goods and people move in and out of the area. This information can help frame an FES strategy that takes these local conditions into consideration.

8) What means of transport will your program have for transporting materials and staff? *(Check all that apply)*

- ❑ a. Airplane or helicopter
- ❑ b. 4x4 vehicle
- ❑ c. Motorbike
- ❑ d. Bicycle
- ❑ e. Draft-powered cart
- ❑ f. Other _____

9) Are the roads into/out of the camp safe to travel regularly? ❑ YES ❑ NO

10) Are the roads into/out of the settlement structurally sound to carry vehicle traffic reliably? ❑ YES ❑ NO

11) What security measures/equipment will you have for transport of materials and people?

_____

12) Will weather conditions affect your ability to transport materials/staff (heavy rains, mud, etc.)? ❑ YES ❑ NO

a. If YES, detail conditions:

_____

_____

13) Will project staff have limited access to the camp/settlement due to curfews or camp/settlement policies? ❑ YES ❑ NO

a. If so, what restrictions will they face? Please describe/provide details:

_____

_____

14) What natural resources will you have access to in the immediate vicinity?
(Check all that apply)

- ❑ a. Firewood
- ❑ b. Dung
- ❑ c. Straw/other agricultural residues
- ❑ d. Grasses/other biomass
- ❑ e. Clay
- ❑ f. Other _____

THE MARKET

Knowledge of the resources and labor skills available in local market(s) will inform your selection of stove model, help you decide if it is feasible to make the stove locally, and help you estimate the cost to produce the stoves.

15) What sort of skills and services are available among the targeted group (displaced persons) and the local community? *(Check all that apply)*

- ❑ a. Brick makers
- ❑ b. Metal workers
- ❑ c. Potters
- ❑ d. Kiln operators
- ❑ e. Teachers/trainers
- ❑ f. Other (i.e., artists, musicians, etc.)_____

16) Are there any cooking stoves for sale at the local/regional market?
(List all types below; add lines if necessary)

a. Type 1 _____
b. Type 2 _____
c. Type 3 _____
d. Type 4 _____

17) Have people been observed buying stoves at the local market?

❑ YES ❑ NO

18) How much do they cost? *(List cost for stoves reported in question 16)*

a.	Type 1 _____	Local cost _____	US$ _____
b.	Type 2 _____	Local cost _____	US$_____
c.	Type 3 _____	Local cost _____	US$_____
d.	Type 4 _____	Local cost _____	US$_____

19) Where are the markets located?

- ❑ a. In the camp/settlement
- ❑ b. In nearby trading center
- ❑ c. In more distant town
- ❑ d. Other _____

20) How do people and goods move from the camp to these markets?
(Check all methods used)

- ❑ a. Walk
- ❑ b. Bicycle
- ❑ c. Use their own motorized vehicle
- ❑ d. Ride at no cost with known or unknown people with a vehicle
- ❑ e. Hired/paid ride
- ❑ f. Other _____

21) What types of cooking fuel are available for purchase in the local market?
(Check all that apply)

- ❑ a. Charcoal
- ❑ b. Firewood/branches
- ❑ c. Dung
- ❑ d. Biomass (agriculture waste, shrubs, roots)
- ❑ e. Liquefied petroleum gas (LPG)
- ❑ f. Kerosene

22) How much does the fuel cost? *(list cost for fuel reported in question 20)*

a. Charcoal: (*specify unit*) _____ Local cost per unit _____US$_____
b. Firewood: (*specify unit*) _____ Local cost per unit_____US$_____
c. Dung: (*specify unit*) _____Local cost per unit_____US$_____
d. Biomass (agriculture waste, shrubs, roots): (*specify unit*) _____
Local cost per unit_____US$_____
e. Liquefied petroleum gas (LPG): (*specify unit*)_____
Local cost per unit _____US$_____
f. Kerosene: (*specify unit*)_____Local cost per unit _____US$_____

LOCAL CAMP/SETTLEMENT/COMMUNITY MANAGEMENT

Understanding the local power structure and relationships within the camp/settlement will help you develop a dissemination strategy for your stoves, and to utilize existing avenues for outreach, advocacy, and training activities.

23) Who is in charge of this community/camp/settlement?

- ❑ a. Government – local or national
- ❑ b. Relief agencies (*name*) _____
- ❑ c. Community/camp leader/elder (*specify*) _____
- ❑ d. Other *(specify)* _____

24) How is the community/settlement itself organized? Are residents living mostly with neighbors of their pre-displacement village, or are they mixed in with people from other areas?

_____

25) Are there any local rules or laws that may affect your organization's ability to implement this program? Some examples include:

- ❑ a. Land restrictions such as protected or park lands
- ❑ b. Resource harvesting restrictions
- ❑ c. Government or camp permits
- ❑ d. VAT/import duties (Rate: _____)
- ❑ e. Other *(specify)*

_____

_____

_____

26) Is a food ration being distributed? ❑ YES ❑ NO

If yes:

a. How often is the ration distributed? _____

b. What does it consist of? (specify type of food and amounts per distribution)

_____

27) Are cooking utensils/kits being distributed? ❑ YES ❑ NO

If YES:

a. Do they include pots? ❑ YES ❑ NO

i. If YES, are the pots a standard size? ❑ YES ❑ NO

ii. Are there enough? (in other words, is the target population having to purchase additional pot(s) to cook their meals?) ❑ YES ❑ NO

iii. What other utensils are included (e.g., spoons, knives, bowls, etc.)?

_____

_____

OTHER FES ACTIVITIES

It is often advisable for a new implementer to continue the work of a partially completed successful program and add capacity rather than to start a brand new FES program. This section begins to collect information that will highlight programmatic gaps, overall program impact, and possible partners for collaboration. Sometimes an FES program will start well, and then stop due to lack of funding or staff capacity—finding out what is and is not working will help you formulate a plan for successful implementation.

28) Have there been FES programs implemented in this area in the past?
❑ YES ❑ NO

a. If yes, by whom? _____

b. Are there reports or lessons learned available? ❑ YES ❑ NO

29) Is there an FES program being implemented at present?
❑ YES ❑ NO

If YES:

a. Does FES coordination exist among NGOs, local authorities and targeted populations? ❑ YES ❑ NO
i. *If YES, what type of coordination exists?*_____

b. Are there reports or lessons learned available? ❑ YES ❑ NO
i. *If YES, are you able to access this information?* ❑ YES ❑ NO

c. What types of stoves are being promoted?_____

d. How are they being distributed?
❑ Freely distributed by program
❑ Built by participants with instruction by program
❑ Sold by program Cost_____

e. How many households still lack an improved stove or won't be covered by the existing program(s)?_____

COOKING FUEL

Knowing more about the fuel used for cooking, how people obtain it, and the challenges they face getting fuel will help you to select a stove model appropriate for the target community or site. The information collected in this section also will be used to tailor the household assessment. Some of this information may also appear in the Step 3 Tool B household survey; because this information is so critical to any FES program, it is important to collect information from both community/camp/settlement leaders and average households (especially the cooks) to determine any gaps in perception that may need to be addressed in the FES program.

30) What kind of cooking fuel is used in the camp? *(Check the TWO used most often)*

- ❑ a. Wood
- ❑ b. Charcoal
- ❑ c. Animal dung
- ❑ d. Grass/straw/husks
- ❑ e. Kerosene
- ❑ f. LPG
- ❑ g. Other _____

31) How do people obtain fuel? *(Check all that apply)*

- ❑ a. Buy at market
- ❑ b. Gather outside settlement
- ❑ c. Given to them
- ❑ d. Barter
- ❑ e. Other _____

32) Are there any cultural taboos about fuel? For example, some cultures will never touch animal dung for cooking or constructing stoves.

❑ YES ❑ NO

If yes, describe in detail what they are:

_____

_____

33) Are people experiencing problems with the current source of fuel?

❑ YES ❑ NO

If YES, check all below that apply

- ❑ a. High price
- ❑ b. Poor quality
- ❑ c. Problems with personal security in obtaining fuel (*specify*) _____
- ❑ d. Fuel shortages
- ❑ e. Long distances must be traveled to collect fuel
- ❑ f. Seasonal fluctuation in fuel availability
- ❑ g. Competition between groups for access to fuel or foraging land
- ❑ h. Other _____

TOOL B: **Household Survey Template**

TAILORING THE HOUSEHOLD SURVEY TO YOUR SITE

You will use the information gathered from this household survey to help design your FES program and select the stove model you wish to promote. The survey information will identify the cooking practices of the target population, as well as the stoves and cooking fuels currently being used.

No sample survey will fit exactly the needs and conditions of all camps/settlements. You should modify the survey provided in this Toolkit to reflect the particular conditions of the site where you will be implementing your FES program by using the findings from your site survey. Once the household survey has been adjusted to reflect the specific characteristics of your site, the survey questionnaire will need to be translated into each language that is spoken at your site. It is recommended that the translation be conducted by a translator who knows English as well as the local language(s), and who is familiar with local cooking practices and cookstove terminology. Once the translation is completed, a second person should translate it back into the original language, to catch any potential errors due to poor translation or uncertainty about the meaning of a particular question. This process is the best way to ensure an accurate translation.

The final translated survey needs to be pre-tested with a small number of respondents before the survey is rolled out. According to the results of this pre-test, you may need to make appropriate adjustments. It is also important to field-test the survey sheets and data-collection process, to ensure that your staff can comfortably conduct the survey in a field environment. A sample data collection spreadsheet is included in the flash drive (note that this spreadsheet will need to be modified to match the final version of your survey instrument).

Adjusting the survey and developing the final survey and data collection instruments will take approximately two to three weeks. The number of survey questions in this Toolkit has been limited to those that are most crucial to the development of an FES program design in order to minimize the time required to complete the survey. The survey should take an estimated 30 minutes to implement per household. However, it may take more or less time at your particular site, depending on the willingness of households to participate, cultural norms, security requirements, and travel time between households.

SELECTING THE SAMPLE FOR THE HOUSEHOLD SURVEY

Ideally, the household survey respondents should be chosen according to **random sampling** methodology to ensure that the population sampled is representative of the households that you plan to target for your FES program. Guidance on selecting a random sample may be found in Step 11Tool D. (A useful tutorial on sampling can be found at the following site: http://www83.homepage.villanova.edu/richard.jacobs/EDU%208603/lessons/sampling.ppt#256,1,Educational Research: Sampling a Population)

If random sampling is not possible due to financial, logistical, or time constraints, a non-random, or **purposeful**, sample can be used. To obtain a purposeful sample, households are selected based on predetermined criteria that are identified according to information gathered in the site survey. The households chosen should reflect more typical or common characteristics of the target population. The chosen households should also reflect both ethnic make-up and cultural norms of the target area as well as the ranges in household size, shelter type, and cooking practices. The size of the sample you need varies with the size of the proposed program; however, OFDA recommends that the number of households surveyed be at least 10% of the number of households to be targeted for your FES program. If the number of households in the target area is relatively large (more than 1,000 households), OFDA recommends that the minimum sample size be 100 households.

IMPLEMENTING THE HOUSEHOLD SURVEY

Participation in the survey should be completely voluntary. Make sure to explain to households willing to participate that there are no "right" or "wrong" answers, that their responses are confidential, and that you are asking for their name only to follow up in case you have a question later.

You should not suggest answers or read out aloud the listed answers on the questionnaire, unless otherwise indicated. Always listen closely to the respondent and match her/his answer to the listed answers on the questionnaire. Although this method can make data entry more complicated, it helps prevent you from "leading" respondents to respond in certain ways. If a respondent's answer does not match any of the choices in the list provided, you should mark "other" and note down the exact response.

The flash drive contains a data entry sheet for you to use with the survey. It is important to assign numerical codes for every survey response, including the open-ended responses, so data can be tabulated accurately when you prepare the final survey results. It is helpful to keep a "code book" as you administer the questionnaire that records the different responses to the open-ended questions and the assigned code for each.

For example: question 2. **What languages do the head, primary, and secondary cook speak, read, and write?**

A. Read (yes 1 - no 2)
B. Write (yes 1- no 2)
C. Which language(s): ____ (code as you enter data)

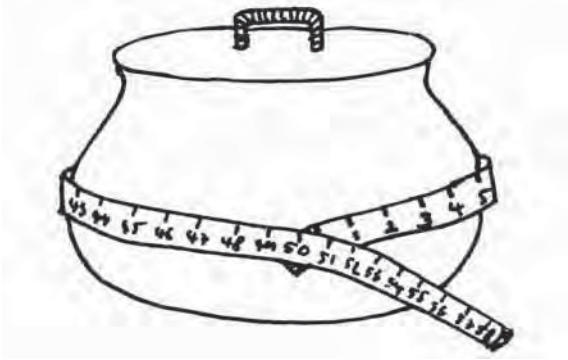
Code for question 2C
1 = Arabic
2 = Swahili
3, 4, 5, etc. = add in any additional languages

If the person in the first questionnaire is able to read and/or write in Arabic, you'll assign a code 1 for C; if the person in the second questionnaire is able to read/write in Arabic, you again use the code 1. If s/he's able to use Swahili, you will add a new code, 2, to C that corresponds to Swahili and use code 2 in any subsequent questionnaires where the respondents indicate they read/write Swahili. This is a quick and simple way to code the open questions, but it requires you to be consistent and precise.

For other questions, the coding system will work in a similar manner. With a broader question such as "Why do you like the three-stone fire?" you may have to group similar answers under the same code. For example, the response "it is tradition" and "my family always used this stove" should be assigned the same code. In cases where you are not sure if they should be given the same code, you should assign a separate code for each answer and decide once you are at the data analysis stage whether certain answers should be grouped together.

Measurements

The diameter of pots and pans should be measured with a measuring tape.



HOUSEHOLD SURVEY TEMPLATE *(an electronic version of this survey is provided on the flash drive)*

The household survey included here contains essential questions needed to assess the camp/settlement cooking conditions. You may need to alter, add, or delete questions to make the assessment more relevant to your situation.

GENERAL INFORMATION

1) **Please note the following information about the household head and the primary and secondary cook.** *(Only fill in information about secondary cook if primary cook is absent. If the primary cook is a child, try to have him/her answer these questions. Note here if primary or secondary is also household head:*

_____

	NAME	MALE/ FEMALE	AGE	HAS BEEN COOKING MORE THAN ONE YEAR?	PRESENT AT INTERVIEW?
Head of household		❑ MALE (1) ❑ FEMALE (2)		❑ YES (1) ❑ NO (2)	❑ YES (1) ❑ NO (2)
Primary cook		❑ MALE (1) ❑ FEMALE (2)		❑ YES (1) ❑ NO (2)	❑ YES (1) ❑ NO (2)
Secondary cook		❑ MALE (1) ❑ FEMALE (2)		❑ YES (1) ❑ NO (2)	❑ YES (1) ❑ NO (2)

2) What languages do the head, primary and secondary cook speak, read and write?

	LANGUAGE SPOKEN	READ OR WRITE Yes/No
Head of household		Read ❑ YES(1) ❑ NO(2) Write ❑ YES(1) ❑ NO(2)
Primary cook		Read ❑ YES(1) ❑ NO(2) Write ❑ YES(1) ❑ NO(2)
Secondary cook		Read ❑ YES(1) ❑ NO(2) Write ❑ YES(1) ❑ NO(2)

MEALS

The following questions will help you to learn more about the cooking habits of the target population, typical cooking tools and techniques, and types of food prepared. Understanding customary cooking temperatures (simmer, fry, etc.) will help you to select an appropriate stove. For instance, foods that require long cooking times at a low steady heat may be well-suited to thicker stoves made of clay or bricks, while meals that are primarily prepared by frying or boiling would be easier to cook with a thinner metal stove that heats up quickly. The data obtained from these questions will help you prepare the most appropriate stove intervention for your target population.

3) How many main meals a day are you preparing? _____

4) Whom do you prepare meals for? And for how many people in total?
(Check all groups a-d that respondent names and ask for a number of people response for each group named. Code the number of people according to the coding key below.)

	NUMBER OF PEOPLE
❑ a. Immediate family	_____
❑ b. Extended household	_____
❑ c. Neighbors	_____
❑ d. Paying customers	_____

CODING KEY

1 = 1	5 = 5
2 = 2	6 = 6
3 = 3	7 = 7
4 = 4	8 = 8

5) What types of food are cooked regularly?
(Check all foods named, and fill in "Other" as mentioned by respondent. Code according to listing – Grains – 1, Legumes – 2, etc.)

- ❑ a. Grains **(1)**
- ❑ b. Legumes **(2)**
- ❑ c. Bread **(3)**
- ❑ d. Meat sauce **(4)**
- ❑ e. Vegetable sauce **(5)**
- ❑ f. Stew **(6)**
- ❑ g. Other **(7)** _____

6) How are the meals served?

- ❑ a. Served hot just after being prepared **(1)**
- ❑ b. Re-heated then served (cooked earlier during the day) **(2)**
- ❑ c. Served at ambient temperature **(3)**
- ❑ d. Other **(4)** _____

7) What are the typical meals that you cook for the household? How is each meal prepared? How many times per week is the meal served and at what time of day is it served? *(Write in meal type; use the key to code to answer "How Prepared"; record times/week as the number given by respondent. If more than one method is used for one meal, enter the corresponding number code for each method. A meal requires food preparation. If only coffee or tea is prepared, do not count this as a meal.)*

	MEAL	HOW PREPARED	TIMES PER WEEK	TIME OF DAY SERVED
Typical Meal 1		❑ BOIL (liquid and/or solids on high heat) **(1)** ❑ SIMMER (liquid and/or solids on low heat) **(2)** ❑ FRY (solids over high heat) **(3)** ❑ BAKE (in oven or other closed space) **(4)** ❑ Other: **(5)** _____		❑ MORNING **(1)** ❑ MID-DAY **(2)** ❑ AFTERNOON **(3)** ❑ EVENING **(4)**
Typical Meal 2		❑ BOIL (liquid and/or solids on high heat) **(1)** ❑ SIMMER (liquid and/or solids on low heat) **(2)** ❑ FRY (solids over high heat) **(3)** ❑ BAKE (in oven or other closed space) **(4)** ❑ Other: **(5)** _____)		❑ MORNING **(1)** ❑ MID-DAY **(2)** ❑ AFTERNOON **(3)** ❑ EVENING **(4)**
Typical Meal 3		❑ BOIL (liquid and/or solids on high heat) **(1)** ❑ SIMMER (liquid and/or solids on low heat) **(2)** ❑ FRY (solids over high heat) **(3)** ❑ BAKE (in oven or other closed space) **(4)** ❑ Other: **(5)** _____		❑ MORNING **(1)** ❑ MID-DAY **(2)** ❑ AFTERNOON **(3)** ❑ EVENING **(4)**

COOKING PRACTICES

8) Where do you usually cook? *(Check ONE response only)*

- ❑ a. In the main building used for living or sleeping (with partition) **(1)**
- ❑ b. In the main building used for living or sleeping (without partition) **(2)**
- ❑ c. In a separate room used as kitchen **(3)**
- ❑ d. In a separate building used as kitchen **(4)**
- ❑ e. Outdoors (with one or two makeshift walls and roof) **(5)**
- ❑ f. Outdoors (open air with no walls) **(6)**
- ❑ g. Other **(7)** _____

9) Do you know about and use any fuel-saving practices when you cook?
(Read each method to the respondent and code '1' for yes and '2' for no for each method.)

Do you know that *(insert a-f)* **can save fuel?**	**KNOW**	**USE**
a. Presoaking foods	❑ YES ❑ NO	❑ YES ❑ NO
b. Covering pots with lids when cooking	❑ YES ❑ NO	❑ YES ❑ NO
c. Cutting large pieces of wood into smaller pieces	❑ YES ❑ NO	❑ YES ❑ NO
d. Cutting ingredients into small pieces before cooking	❑ YES ❑ NO	❑ YES ❑ NO
e. Sheltering the cooking fire from wind	❑ YES ❑ NO	❑ YES ❑ NO
f. Cooking with two pots on the same fire	❑ YES ❑ NO	❑ YES ❑ NO
g. Is there anything else you do to speed up cooking or reduce fuel used? *If YES specify*: _____	❑ YES ❑ NO	❑ YES ❑ NO

10) Other than cooking, how many times per week do you use your stove and for what purpose? *(Read each purpose and record number for the times per week as respondent answers)*

	TIMES/WEEK
a. Heating water for bathing	_____
b. Making food or beverage for sale	_____
c. Using stove for light, security or heat	_____
d. Heating water for washing dishes	_____
e. Other *(specify)* _____	_____

CODING KEY

1 = 1	5 = 5
2 = 2	6 = 6
3 = 3	7 = 7
4 = 4	0 = 8

11) How many different pots do you use? _____

(Measure and write down the diameter of the most frequently used pots. Thin aluminum refers to mass-produced, factory-made pots and thick aluminum refers to artisanally or locally made pots.)

❑ **Clay or Earthenware**	Does the pot have a lid? ❑ YES (1) ❑ NO (2) Does the lid fit tightly? ❑ YES (1) ❑ NO (2) Diameter of most frequently used (in cm) _____ Bottom is: ❑ ROUND (1) ❑ FLAT (2)	
	WHERE DID YOU GET THE POT? ❑ Has been in my family a long time (1) ❑ Bought at the market or in a store (2) ❑ Received during a relief distribution (3) ❑ Gift (4) ❑ Made myself (5)	**HOW OFTEN IS THIS POT USED?** ❑ Once or more a day (1) ❑ At least once a week (2) ❑ 1 to 3 times every month (3) ❑ Almost never (4)
❑ **Thick aluminum**	Does the pot have a lid? ❑ YES (1) ❑ NO (2) Does the lid fit tightly? ❑ YES (1) ❑ NO (2) Diameter of most frequently used (in cm) _____ Bottom is: ❑ ROUND (1) ❑ FLAT (2)	
	WHERE DID YOU GET THE POT? ❑ Has been in my family a long time (1) ❑ Bought at the market or in a store (2) ❑ Received during a relief distribution (3) ❑ Gift (4) ❑ Made myself (5)	**HOW OFTEN IS THIS POT USED?** ❑ Once or more a day (1) ❑ At least once a week (2) ❑ 1 to 3 times every month (3) ❑ Almost never (4)
❑ **Thin aluminum**	Does the pot have a lid? ❑ YES (1) ❑ NO (2) Does the lid fit tightly? ❑ YES (1) ❑ NO (2) Diameter of most frequently used (in cm) _____ Bottom is: ❑ ROUND (1) ❑ FLAT (2)	
	WHERE DID YOU GET THE POT? ❑ Has been in my family a long time (1) ❑ Bought at the market or in a store (2) ❑ Received during a relief distribution (3) ❑ Gift (4) ❑ Made myself (5)	**HOW OFTEN IS THIS POT USED?** ❑ Once or more a day (1) ❑ At least once a week (2) ❑ 1 to 3 times every month (3) ❑ Almost never (4)

TABLE CONTINUED →

❑ **Other:**	Does the pot have a lid? ❑ YES **(1)** ❑ NO **(2)** Does the lid fit tightly? ❑ YES **(1)** ❑ NO **(2)** Diameter of most frequently used (in cm) _____ Bottom is: ❑ ROUND **(1)** ❑ FLAT **(2)**

WHERE DID YOU GET THE POT?	**HOW OFTEN IS THIS POT USED?**
❑ Has been in my family a long time **(1)**	❑ Once or more a day **(1)**
❑ Bought at the market or in a store **(2)**	❑ At least once a week **(2)**
❑ Received during a relief distribution **(3)**	❑ 1 to 3 times every month **(3)**
❑ Gift **(4)**	❑ Almost never **(4)**
❑ Made myself **(5)**	

12) Are there traditional stools, supports (pot rests, tables, etc.), or techniques that you like to use when cooking? *(Record all stools, supports, and/or techniques that are named by respondent in the space below. For stools, supports, or other physical objects, take measurements and sketch/photograph the object.)*

13) How do you tend your cooking fire?

- ❑ Make one large fire every morning and leave it to burn until extinguished **(1)**
- ❑ Maintain a constant fire all day for ease of food preparation or heating **(2)**
- ❑ Douse embers after every meal is cooked and prepare new fire as needed **(3)**
- ❑ Other **(4)** _____

14) When you cook, do you like to do other things at the same time or do you focus only on cooking? *(Try to learn from this question if they are constantly tending the stove and food, or just letting things boil/simmer while they tend to other chores.)*

- ❑ Talk with friends/family **(1)**
- ❑ Clean or do other housework **(2)**
- ❑ Go to the market **(3)**
- ❑ Tend children **(4)**
- ❑ Do income-generating work **(5)**
- ❑ Other **(6)** _____

STOVE USE

15) What is your current stove made out of? *(This should be confirmed visually)*

- ❑ a. Three-stone fire (made with stones or bricks) (1)
- ❑ b. Mud (with clay/sand/grass etc) (2)
- ❑ c. Metal (3)
- ❑ d. Ceramic (4)
- ❑ e. Combination ceramic and metal (5)
- ❑ f. Other (6) _____

16) What do you like and dislike about your stove? *(Code all reasons given; do not read the list)*

LIKE

- ❑ Tradition (1)
- ❑ Cheap (2)
- ❑ Simple to use (3)
- ❑ Best stove available (4)
- ❑ Ignites easily (5)
- ❑ Use many sizes of pots (6)
- ❑ Don't know any other stoves (7)
- ❑ Cooks quickly (8)
- ❑ Can control heat/fire easily (9)
- ❑ Other (10) _____

DISLIKE

- ❑ Dirty (gets soot in house, pots) (1)
- ❑ Smoky (2)
- ❑ Dangerous (i.e., not stable) (3)
- ❑ Uses a lot of fuel (4)
- ❑ Can cause fires/burn people (5)
- ❑ Cooks too quickly (6)
- ❑ Cooks too slowly (7)
- ❑ Can't control heat/fire easily (8)
- ❑ Other (9) _____

Have you always used this kind of stove?

- ❑ YES (1)
- ❑ NO (2)

a. If no, what type of stove did you use in the past? _____

b. If no, why are you now using a different type of stove? _____

17) How did you get this stove? *(Check ONE)*

- ❑ a. Made it at home **(1)**
- ❑ b. Given to me by a friend/family member **(2)**
- ❑ c. Given to me by a relief organization **(3)**
  Name of organization _____
- ❑ d. Bought it **(4)**
  What was the cost? _____
- ❑ e. Other *(specify)* **(5)** _____

18) Does your stove produce a lot of smoke when you cook?

❑ YES **(1)** ❑ NO **(2)**

a. *If YES, is this a good thing or bad thing?*

- ❑ Good **(1)**
- ❑ Bad **(2)**
- ❑ Neither good nor bad **(3)**

Why? *(Try to find out why they think the smoke is good or bad – health reasons, kill mosquitoes, keep spirits away, etc.)*

_____

_____

19) Have you or another family member ever been burned using this stove?

❑ YES **(1)** ❑ NO **(2)**

(Try to get details about the severity of the burn and if children have been burned)

_____

_____

20) Are you aware of any fires in the camp/settlement that started from cookfires in the last three months?

❑ YES **(1)** ❑ NO **(2)**

21) What uses does your stove serve at present? *(Below are the most common uses. Please do not read the choices, but rather let the respondent name their uses and check off those that are listed. If other uses not listed are given, detail them under "Other.")*

❑ a. Cooking **(1)**
❑ b. Heating water/tea **(2)**
❑ c. Space heating **(3)**
❑ d. Heating water for bathing/cleaning **(4)**
❑ e. Lighting **(5)**
❑ f. Safety **(6)**
❑ g. Other **(7)** _____

22) Is your stove used to prepare food or beverages for sale?

❑ YES **(1)** ❑ NO **(2)**

a. *If yes, how often?* _____

CODING KEY

1 = daily
2 = twice or more per week
3 = weekly
4 = several times per month
5 = rarely
6 = other response (list)

FUEL CONSUMPTION

23) Indicate the frequency and reason for frequency of use of following fuel types *(Go through list of relevant fuel types but do not suggest reasons.)*

FUEL	FREQUENCY OF USE	IF YOU USE THIS FUEL FREQUENTLY, WHY?
a. **Firewood**	❑ Use frequently **(1)** ❑ Use occasionally **(2)** ❑ Use rarely **(3)** ❑ Never use **(4)**	❑ readily available **(1)** ❑ can be obtained without money **(2)** ❑ cooks fast **(3)** ❑ produces less smoke **(4)** ❑ everyone uses it **(5)** ❑ easy to use **(6)** ❑ cleaner **(7)**
b. **Charcoal**	❑ Use frequently **(1)** ❑ Use occasionally **(2)** ❑ Use rarely **(3)** ❑ Never use **(4)**	❑ readily available **(1)** ❑ can be obtained without money **(2)** ❑ cooks fast **(3)** ❑ produces less smoke **(4)** ❑ everyone uses it **(5)** ❑ easy to use **(6)** ❑ cleaner **(7)**
c. **Crop residues**	❑ Use frequently **(1)** ❑ Use occasionally **(2)** ❑ Use rarely **(3)** ❑ Never use **(4)**	❑ readily available **(1)** ❑ can be obtained without money **(2)** ❑ cooks fast **(3)** ❑ produces less smoke **(4)** ❑ everyone uses it **(5)** ❑ easy to use **(6)** ❑ cleaner **(7)**
d. **Straw**	❑ Use frequently **(1)** ❑ Use occasionally **(2)** ❑ Use rarely **(3)** ❑ Never use **(4)**	❑ readily available **(1)** ❑ can be obtained without money **(2)** ❑ cooks fast **(3)** ❑ produces less smoke **(4)** ❑ everyone uses it **(5)** ❑ easy to use **(6)** ❑ cleaner **(7)**
e. **Twigs**	❑ Use frequently **(1)** ❑ Use occasionally **(2)** ❑ Use rarely **(3)** ❑ Never use **(4)**	❑ readily available **(1)** ❑ can be obtained without money **(2)** ❑ cooks fast **(3)** ❑ produces less smoke **(4)** ❑ everyone uses it **(5)** ❑ easy to use **(6)** ❑ cleaner **(7)**
f. **Leaves/grass**	❑ Use frequently **(1)** ❑ Use occasionally **(2)** ❑ Use rarely **(3)** ❑ Never use **(4)**	❑ readily available **(1)** ❑ can be obtained without money **(2)** ❑ cooks fast **(3)** ❑ produces less smoke **(4)** ❑ everyone uses it **(5)** ❑ easy to use **(6)** ❑ cleaner **(7)**

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FUEL	FREQUENCY OF USE	WHY DO YOU USE THIS FUEL FREQUENTLY, IF YOU DO?
g. **Roots**	❑ Use frequently (1) ❑ Use occasionally (2) ❑ Use rarely (3) ❑ Never use (4)	❑ readily available (1) ❑ can be obtained without money (2) ❑ cooks fast (3) ❑ produces less smoke (4) ❑ everyone uses it (5) ❑ easy to use (6) ❑ cleaner (7)
h. **Dung**	❑ Use frequently (1) ❑ Use occasionally (2) ❑ Use rarely (3) ❑ Never use (4)	❑ readily available (1) ❑ can be obtained without money (2) ❑ cooks fast (3) ❑ produces less smoke (4) ❑ everyone uses it (5) ❑ easy to use (6) ❑ cleaner (7)
i. **Kerosene**	❑ Use frequently (1) ❑ Use occasionally (2) ❑ Use rarely (3) ❑ Never use (4)	❑ readily available (1) ❑ can be obtained without money (2) ❑ cooks fast (3) ❑ produces less smoke (4) ❑ everyone uses it (5) ❑ easy to use (6) ❑ cleaner (7)
j. **LPG**	❑ Use frequently (1) ❑ Use occasionally (2) ❑ Use rarely (3) ❑ Never use (4)	❑ readily available (1) ❑ can be obtained without money (2) ❑ cooks fast (3) ❑ produces less smoke (4) ❑ everyone uses it (5) ❑ easy to use (6) ❑ cleaner (7)
k. **Other:** _____	❑ Use frequently (1) ❑ Use occasionally (2) ❑ Use rarely (3) ❑ Never use (4)	❑ readily available (1) ❑ can be obtained without money (2) ❑ cooks fast (3) ❑ produces less smoke (4) ❑ everyone uses it (5) ❑ easy to use (6) ❑ cleaner (7)

24) How do you acquire fuel?

- ❑ a. Collect (1)
- ❑ b. Purchase (2)
- ❑ c. Barter (3)
- ❑ d. Relief agency (4)
- ❑ e. Other (5) _____

25) If you purchase fuel, how much do you pay for it? _____

(Specify cost per weight/volume)

(Fill in the price and code their responses to a. and b. with codes given)

a. Is this a reasonable price?

❑ YES (1) ❑ NO (2)

b. Has the price been stable, increasing, decreasing?

❑ INCREASING (1) ❑ STABLE (2) ❑ DECREASING (3)

26) If you barter for fuel, what do you trade?

- ❑ a. Food (1)
- ❑ b. Cash (2)
- ❑ c. Labor in exchange for fuel (3)
- ❑ d. Other (4) _____

27) Do you ever sell food rations to obtain fuel?

❑ YES (1) ❑ NO (2) *(Try to get details)*

a. How much of the ration?

- ❑ Less than half (1)
- ❑ Half (2)
- ❑ More than half (3)
- ❑ All of it (4)

b. How often do you sell the ration/part of the ration? _____

- ❑ 1-3 times/week (1)
- ❑ More than 3 times/week (2)
- ❑ Other *(specify)* (3) _____

28) Do you sell fuel to other households in the camp/settlement or to merchants? *(Ask for the value of their sales for each fuel the respondent sells either sometimes or often)*

				PRICE
a. Firewood	❑ OFTEN (1)	❑ SOMETIMES (2)	❑ NO (3)	_____ per kg/bundle*
b. Charcoal	❑ OFTEN (1)	❑ SOMETIMES (2)	❑ NO (3)	_____ per kg
c. Twigs, wood chips and branches	❑ OFTEN (1)	❑ SOMETIMES (2)	❑ NO (3)	_____ per kg
d. Kerosene	❑ OFTEN (1)	❑ SOMETIMES (2)	❑ NO (3)	_____ per litre
e. Other	❑ OFTEN (1)	❑ SOMETIMES (2)	❑ NO (3)	_____ per kg/litre

** if the response is given per "bundle," the enumerator will have to weigh a local bundle*

29) If you or someone in your household collects the fuel:

a. How long does it take round trip to get the fuel? _____
b. Do you collect from the same location every time, or vary locations? _____
c. Do you collect on your own or in a group? _____
d. How much fuel is collected in one trip? (in estimated kilograms)* _____
e. How many times a week must it be collected? _____

** if the response is given per "bundle," the enumerator will have to weigh a local bundle*

30) Who participates in the fuel gathering (if your household gathers fuel)? *(Indicate the person who gathers most with a "1"; the next person who also gathers but less with a "2"; and so on until all persons who normally gather fuel are covered)*

	RANK
❑ a. Grandfather	_____
❑ b. Grandmother	_____
❑ c. Father	_____
❑ d. Mother	_____
❑ e. Son(s)	_____
❑ f. Daughter(s)	_____
❑ g. Other _____	_____

31) What are the concerns or problems with your fuel supply at present? *(Read the possible responses as written. Read the words in parentheses ( ) only if the respondent asks for clarification).*

- ❑ a. Distance to collect (1)
- ❑ b. Scarcity of fuel (2)
- ❑ c. Seasonal reliability of fuel (i.e., difficult to get/make in rainy season, etc.) (3)
- ❑ d. Price in market for purchase or barter too high (4)
- ❑ e. Time required to collect fuel (5)
- ❑ f. Problems with physical access (i.e., natural risks, barriers, etc.) (6)
- ❑ g. Security problems when collecting fuels. *Specify*: (7)_____
- ❑ h. Inability to collect fuel outside the camp/settlement/community (8)
- ❑ i. Security risks on way to market (9)
- ❑ j. Inefficient means of cooking/source of heat/source of light (10)
- ❑ k. Health concerns (11)
- ❑ l. Other (12) _____

32) Do you dry your fuel before using it in your stove?

❑ YES (1) ❑ NO (2)

If YES, how?

- ❑ In the sun (1)
- ❑ Near the cooking fire (2)
- ❑ Other (3) _____

33) Do you have any concerns about fuel storage?

- ❑ a. Not enough room to store (1)
- ❑ b. Security/theft (2)
- ❑ c. Animals/pests (3)
- ❑ d. Exposure to moisture (4)
- ❑ e. Other (5) _____
- ❑ f. None (6)

34) Would you and your family be willing to participate in a more detailed study that involves daily measurements of fuel consumption?

❑ YES (1) ❑ NO (2)

STEP 4

DESIGNING YOUR FES PROGRAM:

INTERPRETING THE SURVEY DATA

Once you have completed gathering the relevant background information on the proposed site, conducted the household survey, and recorded the results, you must analyze the data and use it to guide your FES program design. Table 1 below will help you interpret the findings of the site and household surveys so that you can first design the broad parameters of your program, and then begin to address specific factors. Step 4 Tool A contains a blank version of the table, which you may populate with data from your own surveys. You may use the same column headings or alter them as necessary for your situation.

After you analyze your survey data, Steps 5-7 will help you refine your design. All of the pieces of an FES program are inter-related, as demonstrated in the table. It is unlikely that all of your findings will point you clearly in one direction; in some cases, you may actually receive contradictory messages. You will have to weigh the relative importance of each factor, but the table can help you recognize the constraints of various approaches, so that you can incorporate mitigation tactics into your design (more on risk mitigation can be found in Step 7).

TABLE 1: ANALYZING YOUR SURVEY DATA

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement characteristics	CAMP/ SETTLEMENT POPULATION	large	Will require significant staff and funding if a large population is being targeted; will have to set realistic dissem-ination targets and consider program extension	Total cost of program may be a factor and influence stove choice	Many stoves and/or stove materials will be needed; strong logistical capabilities will be critical Could warrant ready-made stoves to speed distribution	Multiple distribution points may speed dissemination
		small	If too small, program may not be cost-effective, unless it is one of several small programs in the area	Dwellings/settlement may have more space, enabling consideration of wider range of stoves	Setting up a production facility may not be feasible	Easier to manage dissemination Will have more time to follow up on problems and solicit feedback from users
	ETHNIC PROFILE	Single/ predominant ethnicity	Language/ translation, training, and co-ordination will be simplified	Can likely promote just one stove model	Language implications for training will be simplified	Training and monitoring/ testing will be simplified
		Multiple ethnicities	If too small, program may not be cost-effective, unless it is one of several small programs in the area	Stove choice may be influenced by cultural cooking traditions of the ethnic groups Different preferences may require multiple stove types	Language(s) and cultural norms will need to be considered	Care must be taken to make sure that all ethnicities are treated equitably
	HOUSEHOLD SIZE AND POPULATION DENSITY	Average household size is large (small households are less problematic for an FES program) Site is densely populated and dwellings are close to each other (more space means more options and is less problematic)	If large, may need more than one stove per household, or a larger stove size If there is little space between dwellings, cooking outside may be difficult. Could consider institutional stoves (i.e., multiple families cook together)	The larger the household size, typically the larger the pot required or more pot holes needed—this could impact stove size/design Alternatively, stove must be capable of using a variety of pot sizes Large households may have more children, raising the importance of safety measures such as cool exteriors and stove stability	Space constraints may put limits on whether /how stoves may be produced on-site	Surveys, training and cooking demonstrations may be easier to conduct in densely populated sites

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement characteristics *(continued)*	LOCATION OF CAMP/ SETTLEMENT	Urban vs. rural and proximity to host communities	Rural or remote locations will affect cost and staffing	It may be difficult logistically to transport stoves to a remote location Rural locations tend to be more dependent on wood for fuel; urban dwellers may have greater access to alternatives like charcoal or liquid fuels, and more willingness to use these fuels	Production or warehouse facility must be close to camp/settlement	If close to a town/market, could lead to market for FES outside of the camp/settlement if the FES is found to be desirable Mass media, such as TV or radio, may be an option for marketing and dissemination campaign if close to an urban area Explore opportunities for free access to media
	STABILITY OF CAMP/ SETTLEMENT	Unstable population, i.e., significant movements in and out of site	Feasibility of the program should be carefully assessed Monitoring will be more challenging if households are moving in and out of the camp/ settlement	A durable stove that is transportable likely will be the best choice; households may not want a fixed stove model if they are planning to move soon	A streamlined production or distribution strategy should be pursued	Follow-through with stove recipients will be difficult; monitoring will be affected; training will need to be streamlined
	SHELTER TYPE	Tents/other flammable shelters	—	Ideally stoves should be kept outside flammable living structures. If stove must be used inside, a highly stable model that minimizes smoke production and possibility of loose embers or flames should be selected	—	—
		Small shelters	—	Stoves will have to be small or placed outdoors (depending on the climate)	—	—

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement characteristics *(continued)*	WEATHER	Rainy	Will the site be accessible under rainy conditions?	Rainy climates are not conducive to mud stoves Portability is important if stoves need to be moved inside An indoor stove is recommended; will need to take into consideration space, safety, and pollution concerns	An indoor, covered facility required; seasonal production may be necessary	Training sessions on keeping firewood dry will be needed
		Rainy	Will the site be accessible under rainy conditions?	Rainy climates are not conducive to mud stoves Portability is important if stoves need to be moved inside An indoor stove is recommended; will need to take into consideration space, safety, and pollution concerns	An indoor, covered facility required; seasonal production may be necessary	Training sessions on keeping firewood dry will be needed
		Windy	—	Stove must be stable/heavy enough to withstand being blown over and/or spewing ashes Use of a wind skirt may save fuel If a chimney is included, it must be carefully designed/constructed, and extend three feet above house roof to prevent unwanted air intake Stove should be installed away from doors and windows	—	—

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement characteristics *(continued)*	WEATHER *(continued)*	Cold	Stoves with chimneys generally are more expensive, more difficult/costly to maintain, and end-users require additional training on how to clean the chimney	Best choice may be stoves that are dual use, suitable for cooking as well as heating houses If tightly closed, poorly ventilated kitchens are the norm, then reducing emissions and/or adding chimneys will be important	Indoor, covered facility required; seasonal production and distribution may be necessary	Stoves with chimneys are heavier, larger, and more difficult to distribute; they often must be built in place
Camp/ settlement management	POWER STRUCTURE (HOW LEADERS ARE SELECTED, WHO IS IN CHARGE, ETC.)	Strong leadership	Must ensure that leaders understand and approve the FES program	Must ensure that leaders approve the stove type	Leaders must be aware of the production and distribution strategy and allow local participation	Need to ensure that leaders play a role in promotion and orderly, unbiased dissemination (can help organize community)
		Weak / disinterested leadership	Will not be able to rely on leadership for assistance in selecting production/ training sites, selecting staff, or promoting the program	—	—	May need to look for alternative power structure (women's/men's groups, co-ops or community-based organizations) to work with on stove dissemination; involve alternative groups in dissemination and training Religious organizations might also be an option
	LOCAL RULE AND LOCAL LAWS	Restricted use/harvesting of wood, production of charcoal	May need to incorporate fuel provision into program	Can impact fuel availability, and therefore technology selection	—	If fuel requires special preparation (drying, splitting, etc.) consider providing centralized fuel preparation to remove the onus on end-users

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement management *(continued)*	LOCAL RULE AND LOCAL LAWS *(continued)*	High VAT or import duties	Costs can be higher	If import duties are high or importation is difficult, pre-manufactured stove models may not be feasible Consider local production or importation of stove parts for local assembly	Increases need for of local production	—
Market characteristics	LOCAL LABOR SKILLS AND AVAILABILITY	Skilled metal and/or ceramic artisans unavailable	Need staff and budget for capacity building of artisans/metal workers to develop stove models	Lack of local capacity could lead to selection of pre-assembled stove or simple mud stove Selecting other technologies would require that the FES program build local capacity	Lack of local capacity would require training of production staff	—
		Skilled artisans available	Will lower capacity-building costs	Consideration of a wide range of technologies possible, including stoves that are produced/assembled on-site or nearby	Establishment of small businesses for stove production possible; financing for producers might be necessary Explore the potential for complementary roles among artisans If metal cutting is required, consider one large-scale provider of cut metal for all artisans	—

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Market characteristics *(continued)*	MARKET LOCATION	Close to site; easily accessible with available transport	Market proximity can ease access to materials and labor, which lowers cost	Consider sourcing complete stoves or materials from the local market	No limitations	—
		Far from site or not easily accessible without special transportation	Higher cost likely for labor and materials	Select stove to minimize transport requirements	Need to produce stoves in the camp/settlement or in close proximity to users	—
	MATERIALS FOR STOVE CONSTRUCTION	Abundant availability of local supplies to produce stoves	Reliable supply of goods will help keep costs steady	Many stove models may be considered	Reliable supply of materials makes local production feasible, and likely more sustainable	—
		Limited availability of local supplies to produce stoves	May need to consider transporting goods from far away or importing materials, which will increase costs	Will need to select a stove for which material supply is reliable; may restrict choices Pre-manufactured stoves may be a good choice	On-site production may not be feasible	—
	TRANSPORTATION AVAILABILITY	Adequate road transport is not reliable	Adversely impacts all aspects of operations	Affects stove choice options If stove is produced outside of area and needs to be transported to households, stove weight must be taken into consideration	A steady supply of materials may not be available; this will affect production and distribution schedule Production/distribution facility must be close to site	Weight and durability/fragility will be problematic if local transport is not available/reliable
	LEVEL OF SECURITY IN AND AROUND THE CAMP/ SETTLEMENT	High level of insecurity	Affects the ability to produce and distribute stoves; costs will increase due to higher security requirements; staff recruitment and retention may be affected	Need to ensure that stoves/materials can be transported safely to necessary locations. Must determine if there is a secure site where production and/or dissemination can take place safely May need to select a stove model that minimizes need for training and maintenance	If production sites cannot be secured, consider pre-assembled stoves	Need to consider the safety of people traveling to the stove pick-up site; additional spare parts and maintenance supplies may be needed at the site

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Cooking fuel options	FUEL AVAILABILITY	Wood is difficult to find or very expensive or gathering fuel presents physical risks	Project costs for materials and staff may increase to accommodate need for centralized fuel provision and/or high-performing technologies	Consider a stove model that can use multiple fuels Consider promoting supplemental cooking technologies to minimize fuel use	___	Consider providing additional training in efficient fuel-use practices and preparation of foods Consider supplemental cooking options such as heat retainers and pressure cookers
	CULTURAL TABOOS	Taboos exist on use of certain materials or customs dictate certain practices are beneficial	Could impact selection of stove model and/or production strategy Local staff may refuse to break certain taboos Extra training will be required to overcome resistance to existing taboos (i.e., that removing smoke from stoves will lead to more mosquitoes). Changing attitudes may be difficult	Select a stove model that caters to local beliefs to the extent possible	May need to avoid use of certain materials (i.e., animal dung) or find production staff from another ethnic group that does not share the same taboos	Stove promotion must be well thought-out in order to gain acceptance from local population
	SEASONAL VARIATION	Fuel available for gathering or purchase varies according to season (e.g., agricultural residues are available only after harvest)	Must budget for alternative sources of fuel or select technologies that can use different sources of fuel	More than one stove or a stove that can burn several types of fuels may be needed Supplemental cooking technologies may be desirable	___	Lack of fuel may impact the stove user's perception of stove value Special training may be needed to teach end-users how to adapt to fuel fluctuations

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Cooking practices, cultural habits and preferences	FIRE TENDING HABITS; # OF MEALS COOKED PER DAY; HOURS OF STOVE USE	Cooks prefer the stove to stay hot all day; or they want the stove to have the capacity to produce charcoal, or they need to be able to leave the stove unattended, etc.	Such preferences will affect the type of stove that should be promoted and will inform the type of training (and associated costs) needed	Intensity of stove use affects stove choice: if cooks are using a stove several hours per day, choose a more durable stove that retains heat, and has a door to preserve charcoal Only certain stove types can safely be left unattended. To persuade end-users to change a behavior, extra time and training will be required	___	The greater the behavior change required from end-users, the greater the training needs of the program Significant behavior change will require ongoing training and creative ways of sparking interest (demonstrations, contests, etc.)
	HOW COOKS USE THEIR CURRENT STOVES (STOOLS, SUPPORTS, COOKING TECHNIQUES, INDOOR OR OUTDOOR USE)	Vigorous stirring requires enhanced stove stability Cultural traditions may dictate optimal stove height (i.e., does the cook prefer to sit, stand, or squat?)	The choice of stove and associated costs and staffing requirements will be affected	Choice of stove will be affected, especially regarding dimensions and durability Stoves that do not take into account cultural traditions may not be readily adopted For example: cooks may not be willing or able to chop up wood into small pieces; Some cooks may prefer to cook in groups or socialize while they cook; a stove designed for indoor use might therefore be rejected	___	End-user training should emphasize how the stove suits cooks' requirements; any changes required in behavior must be accounted for in training
	TYPES OF FOODS BEING PREPARED	Different foods require different methods of cooking; some stove materials/ designs are more suitable than others	More than one stove may be needed if multiple cooking techniques are being used Multiple technologies will increase costs and staffing requirements and	Affects choice of stove; a stove that can be adapted to hold multiple pots, or in some cases multiple technologies, will be required How much and how quickly foods need to	___	Supplemental technologies (e.g., solar cookers or hay baskets) may be appropriate based on the cuisine, cooking habits, climate, and end-user lifestyles

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Cooking practices, cultural habits and preferences *(continued)*	TYPES OF FOODS BEING PREPARED *(continued)*		make implementation more complicated	be cooked (long, slow simmering vs. hot fast frying) will influence stove choice		
	POT SIZES	Certain pot sizes may require design adjustments to some stove models	The design of the stove will be affected; design modifications can impact stove cost and speed of roll-out Stoves with metal skirts or rings allow adjustment for pot size while minimizing heat loss	Stove and pot skirt must be able to accommodate common pot sizes and shapes	—	Pot(s) may be combined with the stove to maximize fuel efficiency; care must be taken that the end-user uses the pot designed for the stove, instead of selling the pot
Stoves already in use on site	PRESENCE OF OTHER DONORS IMPLEMENTING FES PROGRAMS IN SAME AREA	Other FES are or have been promoted	All aspects of the program will be affected The proposed program should add value to or fill a void not met by previous programs	Assess other donors' FES programs for lessons learned Consider feasibility/desirability of scaling up the existing stove intervention program(s) Promotion of supplemental cooking options should be considered if feasible	Could use existing production facility	The pre-existing program(s) will impact your strategy (especially if locals perceive that one program offers more benefit or is less costly than another The introduction of multiple stove types may create considerable confusion within the targeted population Pursue coordination with other stove promoters regarding benefits and subsidies

TABLE 1: ANALYZING YOUR SURVEY DATA *(continued)*

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Stoves already in use on site *(continued)*	STOVES ARE AVAILABLE IN THE LOCAL MARKET	Multiple stove options	Locally available stoves might compete with the planned FES program; if these models are used in the program, costs may be reduced	Consider promoting supplemental cooking option(s), if feasible Investigate feasibility/ desirability of supplying locally produced/sold stoves	On-site production facility may not be necessary	The dissem-ination strategy can have a large impact on the viability of locally made stoves; orders can boost local livelihoods, but free distribution may undercut stove producers' ability to continue to sell in the market


fes

STEP 4

TOOLS & RESOURCES

> Step 4 Tool A: Interpreting the Survey Data Table

TOOL A: **Interpreting the Survey Data**

This table is a blank version of the table in Step 4, and can be used to record the results of your own site and household surveys as well as the relevant potential impact of each finding on your program. You should edit, adjust, and add rows as necessary so that you are able to think through the implications fully. An electronic version is provided on the flash drive.

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement characteristics	CAMP/ SETTLEMENT POPULATION					
	ETHNIC PROFILE					
	HOUSEHOLD SIZE AND POPULATION DENSITY					

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement characteristics *(continued)*	LOCATION OF CAMP/ SETTLEMENT					
	STABILITY OF CAMP/ SETTLEMENT					
	SHELTER TYPE					

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement characteristics *(continued)*	WEATHER					

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Camp/ settlement management	POWER STRUCTURE (HOW LEADERS ARE SELECTED, WHO IS IN CHARGE, ETC.)					
	LOCAL RULE AND LOCAL LAWS					

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Market characteristics	LOCAL LABOR SKILLS AND AVAILABILITY					
	MARKET LOCATION					

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Market characteristics *(continued)*	MATERIALS FOR STOVE CONSTRUCTION					
	TRANSPORTATION AVAILABILITY					
	LEVEL OF SECURITY IN AND AROUND THE CAMP/ SETTLEMENT					

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Cooking fuel options	FUEL AVAILABILITY					
	CULTURAL TABOOS					
	SEASONAL VARIATION					

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Cooking practices, cultural habits and preferences	FIRE TENDING HABITS; # OF MEALS COOKED PER DAY; HOURS OF STOVE USE					
	HOW COOKS USE THEIR CURRENT STOVES (STOOLS, SUPPORTS, COOKING TECHNIQUES, INDOOR OR OUTDOOR USE)					
	TYPES OF FOODS BEING PREPARED					

			IMPLICATIONS			
SURVEY TOPIC	**SURVEY SUB-TOPIC**	**FINDINGS**	**SIZE, SCOPE, BUDGET, STAFFING**	**STOVE/ TECHNOLOGY SELECTION**	**PRODUCTION STRATEGY**	**DISSEMINATION STRATEGY**
Cooking practices, cultural habits and preferences *(continued)*	POT SIZES					
Stoves already in use on site	PRESENCE OF OTHER DONORS IMPLEMENTING FES PROGRAMS IN SAME AREA					
	STOVES ARE AVAILABLE IN THE LOCAL MARKET					

DESIGNING YOUR FES PROGRAM:

SELECTING YOUR FES MODEL

I. FACTORS INFLUENCING STOVE SELECTION

This step provides an overview of common FES, their advantages and disadvantages, and key issues and concerns for each type of stove. You can use Step 5 Tool A, FES Reference and Contact Information, and the Resource Guide (Step 12 Tool A) in conjunction with the analysis you conducted in Step 4 to select an appropriate stove for the context in which you are working. While it may not be possible to find a perfect fit for the environment, culture, security considerations, and resources that your NGO is working with, this detailed stove information will help you weigh various factors so that you can select a FES suitable for your target population and program budget.

It is important that you engage an FES expert at this stage of the program design process. At a minimum, the expert should help guide you through the stove selection process, ensuring that you understand the pros and cons of various options, and the ramifications for your implementation strategy. More detail on staffing issues is provided in Step 6.

Fuel-efficient stoves can be categorized in a variety of ways, based upon design principles, construction materials, fuel type, and other factors. This Toolkit focuses on stoves that burn wood, and divides them into three very general categories: mud; ceramic; and pre-fabricated stoves. Supplementary cooking options, including solar cookers and haybaskets, are also included for reference. OFDA is technology-neutral and advocates neither for nor against any particular type of stove. However, all proposals submitted to OFDA must include the justification for stove/technology selection and the measures that will be taken to maximize FES performance and program impact.

Primary considerations that influence stove selection are:

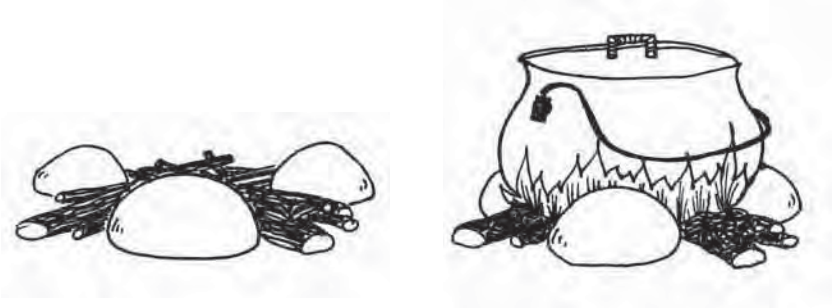
- **SECURITY:** Is the area secure enough to import materials (i.e., can supplies be brought in reliably by ground or air transportation without risk of theft or physical assaults) or will you use materials available in or very near the camp/settlement? Is the area secure enough for you to travel outside of the camp or settlement to collect materials?
- **LOCAL RESOURCES:** Is there mud, clay, agricultural or plant waste readily available? Are metal sheet goods produced locally and available in the market, and are there skilled metal workers available locally? Are there local brick makers or kiln operations? If using local materials, what are the laws/regulations regarding their use? What is the likelihood of tensions with hosts over resources?
- **STAFFING RESOURCES:** Do you have enough staff to conduct assessments, train and oversee the stove production and dissemination process, implement community training on the use of the new stoves and provide follow up for operation and maintenance?
- **FUNDING LEVELS:** What is the estimated total program funding requirement and how many stoves will be produced and distributed with these funds?
- **WEATHER:** What are the average climate characteristics; e.g., hot, cold enough to require heating of homes/shelters, humid, rainy, or sunny? Long rainy seasons and high humidity quickly erode unfired mud or clay stoves. If the area experiences a cold season, households may appreciate a stove model that helps heat the house by retaining heat beyond the cooking time; users in a hot climate might dislike such a characteristic.
- **COOKING HABITS AND USER ACCEPTABILITY:** At what times of day do people cook? Do they cook indoors or outside? What are the types of food and methods of cooking that are used by your target population (i.e., frying, baking, simmering, vigorous stirring, etc.)? Selecting a stove that easily cooks traditional foods is key to gaining end-user acceptance.

As will be discussed further in Step 9 (The Pilot Phase), end-users need to be consulted on the acceptability of any stove before a production/distribution program is rolled out. End-users need to be sufficiently content with the design that they will not modify the dimensions of the stove once it is in their home; even a small change in stove height or size of combustion chamber can have a significant impact on fuel consumption.

Where possible, OFDA encourages you to establish a partial or full cost-recovery program for the stoves. Research indicates that participants who pay for their stoves, **even if it is only a nominal fee**, value and maintain them better than if they receive them at no cost. A full or partial cost-recovery system also increases the likelihood that the intervention will be sustainable over the long term. Money gained through a cost-recovery system should be funneled back into the FES program (perhaps to fund spare parts or materials needed for stove maintenance). In order for cost-recovery efforts to succeed, you must coordinate with other donors providing FES within the same geographical area (no one will pay for something they can obtain for free elsewhere), and you must set up an accounting system to record accurately the flow of money from recipients to your organization, as well as how your organization spends the received funds. You will also need to figure out how to incorporate a payment system into your distribution and beneficiary education strategies.

II. BASELINE FOR FUEL-EFFICIENT STOVES: TRADITIONAL OPEN FIRE/THREE-STONE FIRE

The baseline against which potential FES models should be assessed is the traditional open or three-stone fire, or other traditional stove currently being used at your site. In a traditional open fire, three stones are placed in a triangular pattern on the ground, with the cooking pots resting on the stones directly above the fire. The open flame and lack of chimney or combustion chamber make this cooking fire inherently energy-inefficient. In addition, three-stone fires can produce a lot of smoke, contributing to poor air quality and respiratory illness; they also pose a risk of burns from the unshielded fire.



A Traditional Open Fire/Three-Stone Fire

However, the open fire is widely used by households around the world because it (a) can be assembled virtually everywhere with few resources; (b) can accommodate a variety of pot sizes; (c) costs little or nothing to assemble; and (d) in many places is what cooks are most accustomed to using. It is important to note that a skilled cook can use less fuel on an open fire than s/he might with a poorly made or designed FES.

A successful FES program must have a carefully selected stove model at its core. To qualify for OFDA funding, the FES must at a minimum (a) consume less fuel when cooking a typical meal than the traditional stove currently in use; and (b) be accepted and used by the beneficiaries. FES may confer other advantages over the three-stone fire, since a good stove typically will:

- Produce less smoke than the three-stone fire
- Reduce risk of burns and fires
- Cook faster/as fast as a three-stone fire
- Reduce soot in homes and on pots

In order to determine what type(s) of stove(s) to promote, you should collect and apply the lessons learned from the experiences of other programs and other models that have been used in the region. A good FES expert will be able to help you evaluate other organizations' experiences and incorporate these lessons into the design of your FES program.

Additional resource information about organizations that are working on FES development and testing can be found in the Resource Guide (Step 12 Tool A) at the end of this Toolkit.

III. STOVE TERMINOLOGY PRIMER

To work with FES, you need to understand some basic principles and terminology of stove design. This section explains some basic concepts that can be explored further through consultation with your FES expert.

COMBUSTION CHAMBER

The combustion chamber is the area of the stove where the fuel is burned.

COMBUSTION EFFICIENCY

Combustion efficiency is a measure of how efficiently a device consumes fuel—in other words, the amount of energy that is turned into heat energy by burning. It will vary depending upon the design features of a given stove. Stoves that achieve high combustion efficiencies should require less fuel than those with lower efficiencies. Hot fires burn more cleanly and efficiently, so maximizing combustion efficiency requires finding the right mixture of fuel, air, and spark that will more completely burn the gases emitted from the hot biomass material. Accordingly, factors that affect heat containment and airflow (for example, stove insulation or chimney) can be adjusted in stove designs to boost combustion efficiency.

FUEL EFFICIENCY

Fuel efficiency is the percentage of the heat energy produced during the combustion of fuel that is used to heat food or water. This differs from *combustion efficiency* in that it measures the amount of energy that is used to do work (i.e., cook food) rather than the efficient breaking down of fuel.

HEAT TRANSFER EFFICIENCY

Heat transfer is the percentage of heat released from combustion that enters a cooking pot. The transfer of heat/gases created by combustion to the pot is another important feature of stove design. Improved heat transfer (in other words, keeping hot gases in direct contact with the cooking surface and preventing leakage of heat) should reduce fuel consumption.

Transferring heat to pots or griddles is best done with small air channels, often obtained by placing stones or knobs on the stove for the pot to rest on. The hot flue gases from the fire are forced through these narrow channels, or gaps, where they are then forced against the pot or griddle. If the gap is too large the hot flue gases mostly stay in the middle of the channel and do not pass their heat to the desired cooking surface. If the gaps are too small, the draft diminishes, causing the fire to be cooler, and the emissions to go up, meaning that less heat transfers to the pot or griddle.

AIR INTAKE AND AIRFLOW

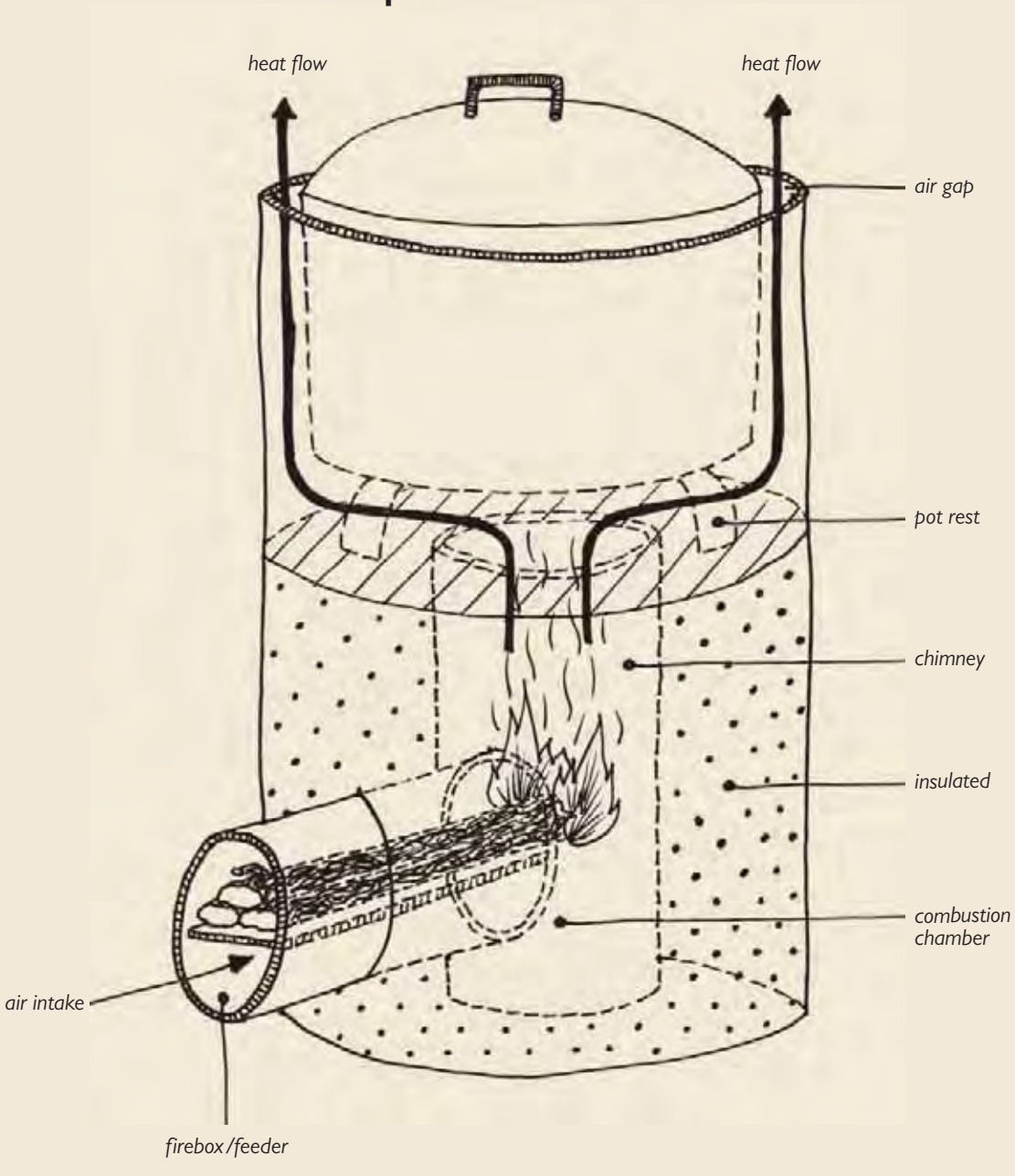
Air is fundamental to the combustion process, and a consistent flow of air through and out of the combustion chamber keeps combustion hot, clean, and consistent. Airflow around and under the fuel stack is also important for complete combustion. Metal or ceramic grates are often helpful in lifting the fuel off of the ground so that air can circulate properly.

CHIMNEY

A chimney, usually a vertical structure, is a device attached to a stove to channel smoke from the combustion chamber away from the stove. The addition of a chimney to a stove can greatly increase airflow, improving combustion and reducing production of smoke (a product of incomplete combustion). A well-designed stove can dramatically improve smoke production from incomplete combustion without a chimney, but a chimney can improve combustion efficiency in most stoves.

A chimney helps to pull air through the fuel opening, across the burning fuel, and out of the stove. The dimensions of the chimney in relation to the combustion chamber are important to balance in order to maximize the benefits. To work properly, chimneys must be kept clean by the user. An incorrectly constructed or dirty chimney can negatively impact stove performance.

Common FES Components



Adapted from a diagram by Peter Scott, http://www.hedon.info/GettingTechnologiesToTheMarket

GASIFIER

A gasifier utilizes a two-stage combustion process in which the wood (or other biomass fuel) is first burned in the lower part of the combustion chamber and then a second influx of air towards the top of the stove mixes and burns the gases released in the first stage. The byproduct of this process is biochar, a charcoal-like substance that can be used as a soil amendment to help soil retain water and nutrients, and protect soil microbes. There are many different designs; some gasifiers have fans to facilitate the combustion process, but these require electricity to operate.

Gasifier stoves typically are quick to heat, have high fuel and energy efficiencies, are lightweight and portable, produce comparatively low levels of emissions, and produce biochar that can be sold to farmers to use as fertilizer. Gasifiers typically are produced in factories and sold fully assembled. They also require specially prepared fuel (small pieces of biomass, regularly fed into the gasifier), can be expensive, and may require extensive end-user training for proper use.

ROCKET STOVE

Rocket stove design principles focus on achieving efficient fuel combustion at a high temperature by ensuring good air draft into the fire, controlled use of fuel, complete combustion, and efficient use of the resultant heat. Stoves using rocket principles can be very simple or complex. However, they all include these design components: an L-shaped, insulated combustion chamber; a small fuel-feed opening to restrict the amount of fuel added to the stove at one time; and a small gap between the stove and cooking pot to improve heat transfer by forcing hot flue gases to scrape against the sides of the pot.

The rest of this section provides guidance on three categories of stoves: (1) mud; (2) ceramic; and (3) pre-fabricated stoves. These categories are very broad, and encompass the stove models most frequently used to date in humanitarian interventions (as opposed to ordinary development contexts). The stove selection matrix may not accommodate all stove models, but seeks to explain in non-technical language common characteristics that can help FES implementers distinguish between models. Each category provides a general overview of the materials, design and production considerations, and advantages and disadvantages of each stove type. This information is supplemented in Step 5 Tool A with contacts and resources for organizations and companies that manufacture or provide design assistance for each type of stove. You should consult the websites provided in this tool frequently, as stove models/designs/prices can change rapidly.

STOVE CATEGORY:

Mud

(sometimes referred to as clay stoves or unfired mud stoves)

MATERIALS: Local organic materials such as clay/sand/mica/straw/grass/sawdust or agricultural waste. Typically the mixture is developed by mixing soil/clay with organic material to hold it together. Dung may also sometimes be added for additional adhesion of materials.

DESIGN: There are many designs that vary in size, number of openings for pots, use of chimneys, etc. Once shaped, mud stoves are dried in the sun over time rather than fired in a kiln. Examples include the *Improved Clay Stove* designed by Practical Action for use in Darfur. More information on this stove is included in Step 5 Tool A.

COST:* **$** Cost will depend on multiple factors, including whether you will need to purchase clay or dung, how far materials will need to be transported, and local labor costs. Generally speaking, this is the least expensive type of stove to produce, aside from a three-stone fire.

PRODUCTION CONSIDERATIONS: Mud stoves must be constructed locally, as they are relatively fragile and will not transport well over long distances. Stoves can be constructed by end-users with proper templates and training; however, it should be noted that without sufficient training and oversight during the production process, user-constructed stoves likely will be of poor quality and durability.

It is advisable to produce simple mud stoves in a communal workspace rather than individually in users' homes to ensure consistent

QUICK FACTS

- Can be used for cooking and heating
- Needs regular maintenance
- Inexpensive
- Best for dry regions

PHOTOS: AHMED HOOD

One-pot mud stoves

* Cost information is given as a general guide of cost per stove, using the following key:

$	US$0 – $10
$$	US$10 – $30
$$$	US$30–$100

and high quality construction in accordance with the original design. Controlling production will be easier with a small group of trained and supervised producers than in a traditional train-the-trainers approach. The stove producers can be local people specially trained to produce the stoves on a large scale for distribution or for sale. (More information on stove production may be found in Steps 6, 7, and 9).

Stoves typically must be left to dry for a period of three days to three weeks before they can be used, depending upon the construction materials, humidity, and size of the stove. Using the stoves before they are fully dry will reduce the durability and longevity of the stove, because the materials have not had time to fully cure and harden before being exposed to cooking temperatures. If not cured properly, the stove sides may crumble and crack after a few uses. Your FES expert will consider the weather and moisture of the clay mixture and advise you on how long the stove will need to dry, and how to determine when a stove has dried completely.

The quality of the clay is an extremely important factor as "weak" clay will crack very fast and make the stove less efficient and undesirable to users. Users can mix the clay with animal dung or other organic materials such as groundnut shells, sugar cane, or rice husks to produce a mixture that will reduce cracking.

ADVANTAGES:

End-user:

- ☑ Wood fuel or charcoal (with addition of a metal or ceramic grate) can be used
- ☑ Reduced fuel consumption compared to three-stone fire if constructed and used properly
- ☑ Less smoke
- ☑ Less risk of fires and burns (if built and used properly)
- ☑ In colder climates or seasons can be used for heating living areas in addition to cooking

Production:

- ☑ Inexpensive materials
- ☑ Can be constructed on-site by trained camp/settlement residents
- ☑ Can be made to accommodate multiple pots

DISADVANTAGES:

End-user:

- ☒ Requires regular maintenance to ensure efficiency. Maximum lifespan usually ranges from one-two years, the latter achieved only through extremely diligent maintenance. Maintenance may be necessary on a monthly basis because cracks and crumbling should be patched as soon as they occur
- ☒ Can take a long time to heat up and cook food since the clay typically absorbs a lot of heat
- ☒ Limited portability due to weight and fragility
- ☒ Susceptible to damage from insects such as termites or ants and from weather if used in an unsheltered area
- ☒ Stove designs in which pots rest within the stove hole limit the circumference of the pots that can be used with that stove.
- ☒ Deliberate or accidental over-stuffing of the fuel compartment may damage the stove, reducing performance

Production:

- ☒ Unless a mold is used to standardize the design, efficiency may be lost due to user modifications
- ☒ Limited portability due to weight and fragile nature—stoves should not be transported long distances from production site to homes
- ☒ Comparatively easy to over-stuff with fuel (and thereby damage the stove)
- ☒ Most designs must be built by hand, which takes time and makes quality control difficult
- ☒ Program impact and sustainability can be negatively impacted by the limited lifespan of the stoves

OTHER CONSIDERATIONS:

Dissemination:

- Finished stoves are heavy and should be handled carefully—they are not easily transported over a long distance
- Because proper drying is important, stoves should not be installed in homes until they are fully dried and ready to be used

Maintenance:

- Because they are made of unfired, organic material, and are often exposed to extreme heat and humidity, mud stoves require frequent, ongoing maintenance
- Users need to be trained to notice signs of wear in the stove (cracks, crumbling along the edges and/or stove body, worn or missing pot rests) and how to obtain/prepare materials to mend the stove
- Users must also be taught to not over-stuff the fuel compartment, lest they break off a piece of the stove and reduce its performance
- Maintenance issues are particularly important for program sustainability—stoves may last only a few months before degrading

Mud stoves may be suitable for…

- Locations where security, funding, or other constraints prevent the introduction of more durable stoves
- Sites where production can be centralized and facilities are large enough to store drying stoves
- Regions where there is a need to heat living spaces
- Locations where there are no ceramic or manufacturing/metalworking facilities, and imports of stoves or stove materials are not feasible
- Predictably dry regions, or places where users will be cooking within a shelter (to protect against degradation from moisture)

STOVE CATEGORY:

Ceramic Stove

(sometimes referred to as kiln-fired mud stove)

MATERIALS: Local organic materials—clay, sand, mica, straw/grass/sawdust/agricultural waste. Similar to the mud stove, ceramic stoves are constructed with clay/soil combined with organic materials. The difference is that ceramic stoves are fired at high temperatures in a kiln for added durability (see sidebar on kilns).

DESIGN: A ceramic lining/combustion chamber covered with mud for additional stability and insulation. Some types include the *Mogogo and Maendaleo* stoves. More information on these stoves is included in Appendix 5 Tool A.

COST:* **$** to **$$** Cost will depend on multiple factors, including whether you will need to purchase clay or dung, how far materials need to be transported, whether you must construct a kiln, local labor costs for kiln operators, and whether you add metal cladding.

PRODUCTION CONSIDERATIONS: Local labor and materials can be used, although skilled producers for kiln firing and drying will be needed. The right mix of organic material needs to be calculated and tested before starting full-scale production. If the mix is incorrect, the stove will be too heavy or too light to fire properly, resulting either in a stove body that is porous and fragile, or too dense and absorbs a lot of heat. In either case, efficiencies will not be maximized. Using a mold is a

QUICK FACTS

- Can use wood or charcoal, portable
- Limited flexibility to accommodate pot sizes, ceramic may crack
- Inexpensive to moderate
- More durable than mud

* Cost information is given as a general guide of cost per stove, using the following key:

$	US$0 – $10
$$	US$10 – $30
$$$	US$30–$100

good way to ensure overall design specifications are followed closely, as even small changes in stove design/size can negatively impact stove efficiency and performance.

With some training, end-users can finish the stove by adding mud around the ceramic frame of the combustion chamber. The final mudding lends additional stability and insulation to the stove. Mudding also allows the user to personalize the stove with painted images, lettering, or superficial etchings, which can increase user satisfaction with the stove.

ADVANTAGES:

End-user:

- ☑ Can use wood or charcoal (with addition of a metal or ceramic grate)
- ☑ Stoves can be portable or fixed

Production:

- ☑ Fairly durable if fired/dried correctly
- ☑ It is possible to add a metal layer around the body of the stove to improve durability (but this will increase production costs and labor requirements
- ☑ Many ceramic stoves with metal cladding may be purchased pre-assembled; see Stove Category: Pre-fabricated stoves)

DISADVANTAGES:

End-user:

- ☒ Requires regular maintenance, not to the same degree as the mud stove, but cracks need to be attended to regularly
- ☒ Deliberate or accidental over-stuffing of the fuel compartment may damage the stove
- ☒ Limited flexibility accommodating various pot sizes (depending on design); stoves in which pots rest within the stove hole limit the circumference of the pots usable with those stoves; stoves designed so that the stove rests on top of/over the stove hole allow for greater flexibility in pot size (but there may still be constraints)

Production:

- ☒ Unless a mold is used, efficiency may be reduced due to user modifications
- ☒ More complicated to produce than mud stoves
- ☒ Firing the kiln requires a lot of wood (unless it is a woodless kiln that relies on other type of biomass, e.g. rice husks, to fire the bricks or ceramic cylinders)
- ☒ Stringent quality control of the kiln/firing process and the clay mixture is needed in order to minimize breakage and maximize efficiency

OTHER CONSIDERATIONS:

Dissemination:

- Stoves can be heavier than metal or manufactured stoves, making them less portable for a population in transition, and difficult for women to carry from the production site to their homes

Maintenance:

- Firing the combustion chamber increases the durability of the stove, making it less vulnerable to degradation from weather and heat—most models are still fragile, and the mudded exterior requires maintenance to repair cracks
- Users need to be trained to obtain/prepare materials to repair their stove, and must:
  - (1) check for cracks in the combustion chamber, which can occur from faulty materials, dropping the stove, and regular wear and tear and make repairs as shown in end-user training;
  - (2) patch cracks and crumbling of the unfired, mudded exterior that protects and insulates the ceramic combustion chamber
- Ideally, program staff should monitor stoves in the home for wear, and assist in repairs as needed
- Stove users must be taught not to over-stuff the fuel compartments of the stoves, as this could result in pieces of the stove chipping off and reducing performance

Ceramic stoves may be suitable for…

- Camps/settlements where production can be centralized
- Areas where there is enough fuel to fire the kilns
- Regions where there is a need for heated living spaces
- Places where there are no manufacturing/metalworking facilities
- Areas where risk of exposure to moisture is a concern
- Areas where security or import restrictions may limit the ability to access pre-manufactured stoves or kits

KILNS

What is it? A kiln is a large, insulated chamber (similar to a very large stove) that is heated to high temperatures for the purpose of hardening or drying materials (firing), such as clay. Kilns come in many shapes and sizes, including small, low-tech clamp kilns, pit kilns, and larger kilns made of brick with domed or square heating chambers. Additional information on kilns may be found in the Resource Guide (Step 12 Tool A).

What is it used for? A kiln is necessary if you have selected a ceramic stove or one that incorporates ceramic or bricks into its design. If there are local potters or brick makers, you may be able to hire them to fire your stoves. If there is no local potter or brick maker near your production site, you will need to construct and run your own kiln.

How does it work? A kiln uses wood or other fuel to generate high temperatures within a confined, insulated heating chamber. The items to be "fired" are placed inside the heating chamber. Over the course of several hours, the heat from the kiln will harden the items inside by removing water and bonding the particles together.

Advantages: Firing a mud stove in a kiln adds strength and durability.

Disadvantages: Kilns require wood or other biomass for fuel. For this reason, it is important to use an efficient kiln design to ensure that the fuel savings you achieve with the stoves are not negated by the fuel you use for the kiln. Finding the right heat and time for firing can take some practice. An FES expert must be engaged to help you through this process.

STOVE CATEGORY:

Prefabricated Stoves

(Either kits assembled locally or purchased fully assembled)

MATERIALS: Steel or other heavy metal or sheet metal—new or scrap; sometimes with ceramic liners or grates. Higher-end models may have fans.

DESIGN: These stoves come in many designs and are more expensive than mud or ceramic stoves, (perhaps three to ten times the cost), but typically are more durable. Some examples include the *StoveTec*, *Bukhari*, and *Vesto* stoves. Information on a variety of pre-fabricated stoves is included in Step 5 Tool A.

COST:* **$$$** Cost will depend on multiple factors, including labor costs for assembly, applicable import duties, cost of the stove and/or stove parts, and shipping/transportation cost to your site.

ASSEMBLY CONSIDERATIONS:

***Fully assembled stoves*:** These stoves are purchased ready to use; no assembly is required. They are typically produced in a factory location with a high level of oversight and quality control, are pre-tested for thermal efficiency and emissions, and can be ordered in large quantities.

* Cost information is given as a general guide of cost per stove, using the following key:

$	US$0 – $10
$$	US$10 – $30
$$$	US$30–$100

QUICK FACTS

- Lightweight, portable, durable, heats up quickly
- May require more fuel preparation
- Can be expensive
- May have to deal with import formalities

PHOTO: ENVIROFIT

Envirofit G-3300 fully assembled stove

PHOTO: STOVETEC

StoveTec fully assembled stove

Ready-to-assemble stove kits: These stoves may be purchased as a kit that will require assembly either by your organization, semi-skilled laborers, or by users. Pre-made parts of the stove (usually the combustion chamber) are imported or centrally manufactured to ensure uniformity. The final assembly can take place on site. You must take into account the costs and training associated with any labor and materials needed for assembly.

ADVANTAGES:

End-user:

- ☑ Lightweight
- ☑ Portable
- ☑ Heats up quickly
- ☑ Durable
- ☑ Little maintenance required
- ☑ Can burn wood and charcoal with the proper grate (applies to some models)
- ☑ Often perceived as very attractive because they are seen as more technologically advanced or because many models come in different colors and/or are very shiny

Assembly:

- ☑ Unnecessary if using a fully manufactured stove
- ☑ Kits and templates reduce risk of improper user adjustments that alter stove dimensions or design
- ☑ Some stoves come with manufacturer warrantees

DISADVANTAGES:

End-user:

- ☒ Single-walled metal stoves can corrode quickly if not cared for properly
- ☒ Risk of burns if the stove is not insulated to protect against the exterior metal heating up
- ☒ Although these stoves usually are more durable than mud or ceramic stoves, corrosion or puncturing of the combustion chamber or stove body, or cracking of the ceramic liner may occur
- ☒ Some models may require more fuel preparation or other changes in end-user behavior

- ☒ Some recipients of the stove may not use it in order to maintain its attractive/aesthetic qualities; alternatively other recipients may sell the stove to generate income

Assembly:

- ☒ For stoves that come as kits, assembly still requires time, money, and training
- ☒ Fully assembled stoves and kit stoves are usually more expensive than mud or ceramic stoves that use local materials and labor
- ☒ Supply of stoves may be vulnerable to interruption
- ☒ Materials or kits may need to be imported, which adds to cost and logistical concerns

OTHER CONSIDERATIONS:

Dissemination:

- Cost will be a significant factor in determining how many of these stoves your program will be able to distribute
- The design of the stove, since it can't be changed post-manufacture, must be matched to local conditions, customs, and preferences (e.g., pot size, height of stove) before stoves are purchased and disseminated on a large scale
- You must develop a plan for repairing/replacing components of fully assembled and manufactured stove kits to ensure sustainability of your intervention

Fully assembled stoves:

- These stoves can be purchased in large quantities, which will free up staff time to focus on dissemination, end-user training, and monitoring
- Some pre-assembled stoves may require significant changes in end-user behavior, which might necessitate significant training and consultation

Manufactured stove kits*:*

- If stoves include ceramic lining, the final stove product may be heavier and more fragile to transport than fully assembled stoves made mostly of metal

- In some cases, the kits might be lighter or cheaper to ship than a pre-assembled stove (i.e., the metal is shipped to the site and then shaped on-site)

MAINTENANCE:

- For manufactured stove kits with ceramic linings (which eventually are likely to crack), users need to be trained to notice signs of wear and how to obtain/prepare materials to repair their stoves
- Stove durability and performance may be affected by lack of replacement parts, such as metal skirts, ceramic combustion chambers, metal grates, or pot holders
- Camp/settlement residents can be trained to repair these stoves as a small business activity, and provided supplies for maintenance of stoves
- Training must be provided to ensure quality and consistency of parts supplied locally
- Your organization should discuss all of these issues with the stove manufacturer before purchasing large quantities of stoves

Pre-fabricated stoves may be suitable for…

- Relatively secure areas where transport of materials is not a significant concern
- Areas where import duties/restrictions are not insurmountable
- Settings where commercial sales might be possible
- Among cultures where the staple foods require high-heat cooking such as frying or boiling (metal stoves can reach high temperatures more quickly than most mud or ceramic stoves)
- Areas where maintenance requirements need to be minimized
- Sites where rapid dissemination of stoves is needed and there is little opportunity to establish production facilities
- Programs with adequate funding to purchase fully assembled stoves, or to purchase stove kits and then establish assembly facilities or commission the manufacture of components
- Sites where populations are expected to be resident for a significant period of time and stove durability is a significant concern

Supplementary Cooking Options

There are additional technologies cooks can use to reduce the amount of fuel required to prepare meals. Many of these supplemental options are technologically simple and can be made with local materials. Supplemental technologies can add value to a FES program, particularly when combined with other energy-saving cooking behaviors, which are addressed in Step 10. Used together, an FES and supplemental cooking technology can significantly reduce overall fuel consumption compared to the three-stone fire. However, not all contexts may be conducive to promotion of supplemental technologies; the information below will help you determine whether the cooking habits, climate, and availability of resources at your site warrant consideration of a supplemental cooking technology. Keep in mind that promotion of supplementary cooking options will add to the complexity of your FES program, and staffing, training, and materials should be planned for accordingly. OFDA will also consider proposals for introduction of "supplemental" technologies in lieu of improved stoves, but you must provide the justification for such an intervention.

HAYBASKET

- ***What is it?*** An insulated container with a tightly fitted lid. The container may be insulated with cloth, grass, straw, banana leaves, or other materials.
- ***What is it used for?*** Haybaskets are best suited to cooking legumes and grains, which cook slowly with low heat.

PHOTO: PAM BALDINGER, USAID

Haybasket with insulated liner

- ***How does it work?*** Cooking pots with food are brought to a boil on a stove and allowed to simmer for a few minutes. They are then taken off of the stove and placed into the haybasket. The lid is placed on the basket, which cooks the food using the residual heat in the pot. The lid must fit tightly, and the insulation must be adequate for this to work—otherwise there will not be enough heat to complete the cooking process. The amount of time that food must remain in the sealed haybasket will vary by the type of food, but a general rule of thumb is that the haybox will require one to two times the normal stovetop cooking time.
- ***Advantages:*** Enables cooking without tending a fire, which can free up time and reduce the need for fuelwood. Haybaskets are portable, and are comparatively simple to make and use with adequate training. Production can be incorporated into a livelihoods activity for women.
- ***Disadvantages***: Haybaskets work only for long, slow-cooked foods (legumes, grain, rice). Training, patience, and practice are vital to successful use of this technology (many potential end-users may be skeptical at first as to its utility). The haybasket must not be opened while food is cooking, or heat will be lost. The size of the pot must be considered when making the basket so that the fit is snug.

SOLAR COOKER

- ***What is it?*** A box or panel made of or covered with a reflective coating to concentrate the heat from the sun. These cookers can be manufactured with very little technology, using boxes or panels of cardboard covered in reflective materials. Other types, such as parabolic cookers—which are larger, shaped like a dish, and concentrate the sun's energy at the center—are more technologically sophisticated and expensive.
- ***What is it used for?*** Solar cookers are best suited to foods that are cooked slowly, such as legumes, grains or stews, or to pasteurize water. These cookers can also be used to heat water for non-cooking purposes such as bathing and cleaning.

- ***How does it work?*** The reflective material directs the sun's rays onto the pot, which absorbs the heat and cooks the food inside. Requires proper adjustment of the cooker toward the sun's rays for optimum heat capture.
- ***Advantages***: No fuel purchase or collection necessary; some are portable, and no harmful emissions are produced. Parabolic cookers can be useful for large-scale institutional cooking.
- ***Disadvantages:*** Slow to cook, and may not be suitable for the preparation of certain foods. Dependent on the weather; cannot necessarily cook on demand, and so must be paired with another stove. Can be expensive; in some places metal from the liners or the parabolic dish has been stripped for sale in local markets. Experience with solar cookers has shown that substantial training is needed in order to adapt the user's cooking behavior to the new way of cooking. Solar cookers do not function in early morning hours and at night. Parabolic cookers need to be adjusted regularly to ensure that the cooker is at the optimal angle toward the sun. Cheap models typically are not very sturdy and therefore may not be appropriate for windy sites. Some solar cookers require a special pot; others can accept standard pots—but pots made of dark metal will absorb heat better.

Box solar cooker that can accommodate multiple pots

Parabolic solar cooker concentrates heat on a single pot.

PHOTOS: SOLAR COOKERS INTERNATIONAL http://solarcookers.org/basics/how.html

CUSTOMIZED POTS

- ***What is it?*** A pot designed specifically for use with a particular stove.
- ***How does it work?*** The shape, size, and particular materials used to make the pot are designed to maximize stove performance and ease of use.
- ***Advantages:*** Can increase efficiency and reduce fuel consumption because the optimal surface area of the pot is exposed to the cooking fire.
- ***Disadvantages:*** May increase project cost and complicate stove distribution; difficult to ensure end-users use and don't sell the pots.

PHOTO: STOVETEC

StoveTec's "Super Pot" can be used on an open fire or with an FES to increase fuel savings.

Factors to Consider When Designing an FES Stove Program

TABLE 2:

STOVE SELECTION MATRIX

STOVE TYPE	MATERIALS	PRODUCTION
Mud stove  PHOTO: INTERNATIONAL LIFELINE FUND	Local organic materials such as clay/sand/mica/dung/ straw/grass/sawdust or agricultural waste	The production process is comparatively simple The stoves must be locally constructed, and are air dried rather than fired in a kiln Stove can be constructed by users with proper templates and training

Choosing an appropriate stove for your program is key to whether your intervention will be successful or not. There are many types of FES to choose from, but only certain models that will be appropriate for any specific community and context. Your choice should be based on the information you have collected in the site and household surveys, as well as your assessment of your own organization's implementation capacity. Your FES expert should guide your stove selection process, and also be involved in the development of your stove production (if necessary) and dissemination strategy. Keep in mind that end-users' initial experience with FES is extremely important; if the first model of FES that cooks are introduced to (by you or another organization) is of poor quality or for some other reason not accepted by the local population, it may be very difficult to re-introduce another, better, model later on.

ADVANTAGES

- Wood fuel or charcoal (with addition of a metal or ceramic grate) can be used
- Reduced risk of fires and burns (if built and used properly)
- Can be used for space heating in addition to cooking in colder climates
- Inexpensive materials
- Can be constructed on-site
- Can be designed and fabricated to accommodate multiple pots

DISADVANTAGES

- Can take a long time to heat up and cook food since the clay typically absorbs a lot of heat
- Limited portability due to weight and fragile nature
- Susceptible to damage from such insects as termites or ants, and from weather if used in an unsheltered area
- Low durability of the stove and materials makes it difficult for the user to keep up on repairs
- Maximum lifespan is generally two years with diligent maintenance
- Monthly maintenance may be necessary, as cracks and crumbling should be patched as soon as they occur
- Unless a mold is used to standardize the design, fuel savings may be lost due to user modifications
- Most designs must be built by hand, which takes time and makes quality control difficult
- Program impact and sustainability can be negatively impacted by the limited lifespan of the stoves

SUITABLE FOR

- Locations where security, funding, or other constraints prevent the introduction of more durable stoves
- Sites where production can be centralized and facilities are large enough to store drying stoves
- Regions where there is a need to heat living spaces
- Either predictably dry regions, or places where users will be cooking within a shelter (to protect against degradation from moisture)

STOVE SELECTION MATRIX (continued)

STOVE TYPE	MATERIALS	PRODUCTION
Ceramic 	Local organic materials such as clay/sand/mica/dung/ straw/grass/sawdust or agricultural waste	Local labor and materials can be used, although skilled producers for kiln firing and drying will be needed.
Fully assembled, manufactured  PHOTO: ENVIROFIT	Metal, sometimes with ceramic liners or grates. Higher-end models may have fans	No local production is needed; these stoves are purchased ready to use. Because they are produced in factories with a high level of oversight and quality control, these come with the greatest amount of pre-testing, and may have warranties. They can be ordered in large quantities.

ADVANTAGES	DISADVANTAGES	SUITABLE FOR
• Can use wood or charcoal (with addition of a metal or ceramic grate) • Stoves can be portable or fixed • More durable than mud stove if fired/dried correctly • It is possible to add metals around the body of the stove for more durability	• Requires regular maintenance • Unless a mold is used, fuel savings may be lost due to user modifications • Firing the kiln requires fuel • Quality control of the kiln/firing process and the clay mixture must be stringent in order to minimize breakage and maximize efficiency	• Facilities where production can be centralized • Areas where there is enough fuel for the kilns • Areas where risk of exposure to moisture is a concern • Areas where security or import restrictions may limit the ability to access pre-manufactured stoves or kits
• Lightweight • Portable • Heat up quickly • Durable; less maintenance required compared to other categories • May be able to burn multiple types of fuel (depending upon the specific model)	• Single-walled metal stoves can corrode quickly • There is a risk of burns if the stove is not insulated to protect against the exterior metal getting hot or there are not adequate handles/safety devices to prevent end-users or children from touching the stove • Depending on import duties, product quality, and transportation costs, stoves may be more expensive than mud or ceramic stoves that use local materials and labor • Supply of stoves may be subject to interruption	• Relatively secure areas where transport of materials is not a significant concern • Areas where import duties/restrictions are not insurmountable • Areas where maintenance requirements need to be minimized • Where rapid dissemination of stoves is needed, or there is no capacity/desire to establish production facilities • Where target populations are expected to be resident for prolonged periods

STOVE SELECTION MATRIX (continued)

STOVE TYPE	MATERIALS	PRODUCTION
Ready-to-assemble stove kits	Metal; sometimes with ceramic liners or grates	These stoves may be purchased in kits that will require assembly (to varying degrees) on site Labor and materials needed for assembly must be budgeted for and taken into consideration during the FES program design process

PHOTO: NEW DAWN ENGINEERING

ADVANTAGES

- Usually more durable than mud or ceramic stoves
- Kits are usually lighter than fully assembled stoves, reducing transport costs
- Professional manufacture of pre-assembled components

DISADVANTAGES

- There is a risk of burns if the stove is not insulated to protect against the exterior metal getting hot or there are not adequate handles/safety devices to prevent end-users or children from touching the stove
- Corrosion or puncturing of the combustion chamber or stove body, or cracking of the ceramic liner, may occur
- Assembly still requires time, money, and training, but the kits can ensure the design parameters of the stoves are maintained
- Depending on import duties, product quality, and transportation costs, these stoves may be more expensive than mud or ceramic stoves that use local materials and labor
- Supply of stoves may be subject to interruption

SUITABLE FOR

- Relatively secure areas where the transport of materials is not a significant concern
- Areas where import duties/restrictions are not insurmountable
- Areas where maintenance requirements need to be minimized
- Areas where skilled workers who can assemble stoves are available


fes

STEP 5

TOOLS & RESOURCES

> Step 5 Tool A: Fuel-efficient Stove Resources

This tool contains contact information for websites and organizations with expertise on stove design and production, as well as names of sponsors or manufacturers for stoves falling into the three categories outlined in Step 5. The organizations and stove models listed in this tool are provided as illustrative resources, and their inclusion in no way implies the endorsement of OFDA or USAID. Because the field of FES development is dynamic, we recommend that you contact an organization directly for the latest information about its products. Since mud/ceramic stoves often are made on-site with local materials and distributed for free, it can be difficult to identify specific models by name or assign costs to them. While a few models are listed below, many more options may be located in the websites below and in those provided in the general Resource Guide in Step 12 Tool A.

GENERAL INFORMATION ON STOVE DESIGN AND PRODUCTION

Aprovecho Research Center (http://www.aprovecho.org/lab/index.php): Resources and consulting services on stove benchmarking, testing, training, and evaluation.

ARECOP (Asia Regional Cookstove Program, http://www.arecop.org/about/about.htm): Provides updates on technologies and programs implemented in Asia, as well as tools useful for implementation of mainstream household energy projects.

Bioenergy Listserv (http://www.bioenergylists.org/): A listserv that serves as an information and communication center for those working on/with biomass stoves. Extensive information on various stove designs and technologies.

GTZ: Germany's development agency maintains two programs focused on household energy that provide information on technologies, program implementation, and case studies. Program for Basic Energy Energy and Conservation in Southern Africa (PRoBEC (http://www.probec.org) HERA (Household Energy for Sustainable Development) at http://www.gtz.de/en/themen/12941.htm.

HEDON Household Energy Network (http://www.hedon.info/): A user-driven site that serves as a resource and communication center for those working on household energy issues.

International Network on Household Energy in Humanitarian Settings (http://www.fuelnetwork.org/): A site specifically targeted at humanitarian contexts, endorsed by the UN InterAgency Standing Committee (IASC) Task Force SAFE (Safe Access to Firewood and alternative Energy in Humanitarian Settings).

Partnership for Clean Indoor Air (http://www.pciaonline.org/): Information includes a publication on design principles for stoves, case studies, and guidance on stove design and performance.

World Health Organization (http://www.who.int/indoorair/en/): Provides a number of studies on indoor air pollution and cost-effectiveness of various household energy interventions.

MUD STOVES

Model: The Improved Clay Stove
Organization: Practical Action
Website: http://practicalaction.org/our-work/stovesandfuel-darfur

Practical Action has a useful publication on clay-based technologies for cooking, which can be downloaded from the Web here:
http://practicalaction.org/energy/docs/region_sudan/clay-based-technologies.pdf

CERAMIC STOVES

Model: Mogogo
Organization: Energy Research and Training Center (ERTC)
under the Eritrea Ministry of Energy and Mines
Website: http://www.moem.gov.er/index.php?option=com_content&task=view&id=54&Itemid=74

Model: Maendeleo
Organization: Several organizations have promoted the Maendeleo stove, or used it as a ceramic liner for the charcoal-burning Jiko stove.
Website: http://www.gtz.de/en/

Model: Onil
Organization: HELPS International
Website: http://www.helpsintl.org/default.php and http://www.onilstove.com/
Email: info@onilstove.com
Cost: US$150 (Note: this is the cost for donating a stove. Implementers may be able to obtain a lower price).

PRE-FABRICATED STOVES

Model: StoveTec
Organization: StoveTec and Aprovecho Research Center
Website: http://www.stovetec.net/us/index.php
Contact: Ben West
Email: ben@stovetec.net
Cost: US$8–$10 per stove

Model: Envirofit G3300
Organization: Envirofit International
Website: www.envirofit.org
Contact: Tim Bauer;
Email: tim.bauer@envirofit.org
Cost: Less than US$100 each; specific pricing based on quantity and location must be obtained by the manufacturer.

Model: Natural Draft Stove
Organization: Philips Electronics India Limited
Website: www.research.philips.com/technologies/projects/woodstove.html
Contact: Pawandeep Singh
Email: Pawandeep.Singh@philips.com
Cost: Less than US$100 each; specific pricing based on quantity and location must be obtained by the manufacturer.

Model: Save80
Organization: Climate Management Ltd.
Website: www.climateinterchange.com
Contact: Klaus Trifellner
Email: klaus.trifellner@climatemanagement.de
Cost: Less than US$100 each; specific pricing based on quantity and location must be obtained by the manufacturer.

Model: Leo
Organization: Prakti Design Lab
Website: http://praktidesign.com/
Contact: Mouhsine Serrar
Email: mouhsine@praktidesign.com
Cost: Approximately US$20

PRE-FABRICATED STOVE KITS

Model: Vesto
Organization: New Dawn Engineering
Website: http://www.newdawnengineering.com/website/stove/singlestove/vesto/
Contact: Thabsile Shongwe
Email: thabsile.s@newdawnengineering.com
Cost: Pricing starts at US$60 per stove.

STEP 6

DESIGNING YOUR FES PROGRAM:

STAFFING YOUR FES PROGRAM

This step will help you determine the relationship between your program characteristics and staffing needs. You must choose your implementing staff carefully to ensure that they have the required skills, expertise, and experience to match the needs of your program. The number and types of staff that will be needed depend upon the size of your proposed program, the type of stove you choose to promote, and the production and distribution strategies that you select.

At a minimum, all proposals for OFDA funding should strive to include a full-time program manager, who manages the overall operation of the FES program. Though it is common for individuals with significant responsibilities for other parts of a humanitarian response also to be assigned the task of managing an FES program, these people often lack the experience or time to be involved adequately in the development and execution of FES activities. For that reason, OFDA highly recommends that you employ a full-time FES program manager to oversee all aspects of the FES program. The program manager should understand the humanitarian context, be familiar with logistical issues regarding FES implementation, have had experience with or been trained and briefed on FES project implementation, and have some familiarity with FES technologies. The program manager should be experienced in hiring and supervising local staff, and be able to establish a good relationship with the local community, local leaders, and other relevant groups—particularly women's groups and other stakeholders in the camp/settlement. The program manager's time should be allocated fully to the stove intervention for the duration of the FES program being proposed.

Other staff should be hired based upon the specific parameters and needs of the program. All programs are advised to obtain the services of an FES expert, on a consulting basis or full-time for the duration of the program if stove production is a component of your program. The FES expert, as a consultant or full-time staff, will help select an

appropriate stove model, contribute to the design and implementation of the stove distribution strategy, provide technical assistance and training to staff, and develop stove monitoring and testing protocols for the program. The FES expert may also help evaluate the program and its impacts, offering guidance on changes that may improve performance. The FES expert also will design the stove production component of programs that will involve construction/assembly of stoves on site.

Most FES programs will benefit from a number of local program staff, perhaps residents of the camp/settlement, to help carry out such tasks as assessments, stove production, stove dissemination, end-user training and education, and project monitoring. The exact number and composition of staff (i.e., local vs. expatriate, full-time vs. part-time) will depend upon the nature and resources of the program. Staff from the camp/settlement may be paid or provided other incentives, such as food or other items. Compensation should be well-coordinated among all implementing partners and be completely understood and agreed to by the local staff and/or local camp/settlement management. The benefit of engaging residents is that they are familiar with the local community, culture, and language, and can be instrumental in promoting the FES program. A summary table of the basic recommended staffing needs is provided here, followed by detailed job descriptions and responsibilities of various FES program staff.

TABLE 3: ILLUSTRATIVE FES PROGRAM STAFF AND RESPONSIBILITIES

PROGRAM POSITION	FULL-TIME OR PART-TIME	KEY RESPONSIBILITIES	QUALIFICATIONS
Program manager	Full-time	Oversees all aspects of the FES program, including staffing, production, dissemination, monitoring and evaluation	• Understands the humanitarian context; has had experience with or been trained and briefed on FES project implementation; has some familiarity with FES technologies; understands relationship of FES activities to broader program goals (if applicable) • Experienced in hiring and supervising local staff; able to establish a good relationship with the local community, local leaders, and other relevant groups
FES expert	Short-term consultant or full-time program staff (if program will be producing or assembling stoves)	Selects an appropriate stove model, contributes to the design and implementation of the stove distribution strategy, provides technical assistance and training to staff, and develops stove monitoring and testing protocols for the program Manages stove production supervisor (if applicable); may also supervise monitoring staff	• Understands the humanitarian context and local cooking needs • Familiar with latest stove designs and testing methodologies • On-ground experience implementing FES programs • Has capacity to adapt stove designs to the context while maintaining overall performance • Ability to train program staff in various areas of FES implementation and monitoring
Production supervisor	Full-time (if program involves stove production)	Oversees the production of the stove and ensures quality and consistency of production Ensures that all raw materials are delivered to the production facility and is able to forecast the amount of materials required	• Previous experience in stove production or related products, or able to produce high-quality stoves after receiving training from FES expert • Experience in logistics management and procurement • Knowledge of inventory management and quality control systems

TABLE 3: ILLUSTRATIVE FES PROGRAM STAFF AND RESPONSIBILITIES (continued)

PROGRAM POSITION	FULL-TIME OR PART-TIME	KEY RESPONSIBILITIES	QUALIFICATIONS
Distribution supervisor	Full- or part-time	Develops strategy for and oversees stove distribution Depending upon program size/structure, this person may also serve as the outreach coordinator	• Experience in logistics management and program administration • Accounting skills (if fees will be assessed for stove acquisition) • Good communication skills
Outreach coordinator	Full-time	Ensures that the FES program includes an effective end-user information campaign delivered by well-trained staff	• Strong communication skills—especially oral skills • Ability to read and write; fluency in local languages • Experience with training and/or teaching
Program/ monitoring staff	Full- or part-time, depending upon program size/need	Monitors and reports on key program indicators Collects quantitative and qualitative data Performs other tasks as needed (stove distribution, production, etc.)	• Ability to make consistent and accurate observations and record data • Ability to understand and interact with local community • Ability to apply technical skills after receiving appropriate training

FES PRODUCTION SUPERVISOR *(if stove is being produced or assembled at the camp/settlement; this position may be held jointly by the FES expert in smaller programs)*

The production supervisor oversees the production of the selected stove model and ensures quality and consistency of production. The production supervisor also ensures that all raw materials are delivered to the production facility and is able to predict the amount of materials required. For example, if a ceramic stove is selected, the production supervisor needs to ensure that the correct type and amount of clay is available for production. The production supervisor's key responsibilities may include:

- ensuring that all raw materials and tools that are necessary to build stoves are available at the production site
- overseeing all other logistical issues pertaining to the project such as vendor identification, purchasing agreements, vendor relationships
- monitoring inventory and production rates and communicating these to the program manager and distribution coordinator
- establishing and implementing effective monitoring and reporting systems

If your program includes a large number of stoves produced on site, you will need to hire additional production staff to produce stoves and/or provide daily supervision of end-user stove production. Production staff should be trained by the FES expert and FES production supervisor to produce stoves of consistently high quality. If you choose to import partially-fabricated stoves, your staffing requirements for assembly likely will be much lower than for complete production.

DISTRIBUTION COORDINATOR

The distribution coordinator is responsible for crafting the stove dissemination strategy and overseeing its implementation. In smaller programs, the distribution and training/outreach coordinator positions may be held by the same person. Even if production and distribution occur at the same site, a distribution coordinator should be designated to plan and coordinate stove dissemination, working in conjunction with the

production and outreach staff. The distribution coordinator's key responsibilities may include:

- working with the community to organize an orderly distribution strategy
- setting up distribution outlets and advertising their locations to the community
- developing distribution registration logs and other necessary data collection tools
- overseeing distribution security and logistics issues

OUTREACH COORDINATOR

The outreach coordinator is responsible for ensuring that the FES program develops and implements an effective end-user information campaign delivered by well-trained staff. The primary purpose of end-user outreach is to teach project beneficiaries how to operate and maintain peak performance of their stoves. Training on stove use should be paired with stove distribution activities, and supplemented with stand-alone activities (demonstrations, contests, etc.) as necessary. More information on stove dissemination and end-user outreach may be found in Step 10.

The outreach staff members are essential to the success of an FES project. These staff will most likely be women/men who live in the community, but others could be involved as well depending upon the context. To select end-user outreach staff, you (or your outreach coordinator) should consult with the local leaders and the community groups at your site. Women and men who are well respected within the community and who possess energy and enthusiasm for the new technology may make good trainers.

If different groups within the camp/settlement speak different languages or dialects, you will need outreach staff with the language skills to communicate with each group. The stove recipients need to be provided training in their own language so that they will understand the directions being given and will use the stoves correctly. In addition, it is preferable that outreach staff members be able to read and write so that they can register beneficiaries and provide production and usage reports to monitor program results. However, people who are gifted oral communicators should not be overlooked because they cannot read or write, but they will have to be paired with a literate outreach staff member who can help them fill out monitoring logs and other necessary paperwork.

The gender of the outreach staff should correspond to the gender composition of the program's primary beneficiaries.

PROGRAM/MONITORING STAFF

Program staff are responsible for carrying out the everyday needs of the program, including stove distribution and monitoring and reporting on key program indicators. These staff should collect quantitative and qualitative data that can be fed back to the FES program manager (and other relevant staff) so that necessary adjustments in program strategy can be made (see Step 11 for more information on monitoring). Sample monitoring tasks include:

- obtaining beneficiary opinions on their stoves
- observing beneficiary stove use
- obtaining data on fuel consumption
- collecting data for use in reporting project impacts to project funders

STEP 7

DESIGNING YOUR FES PROGRAM:

ANTICIPATING COMMON PROBLEMS

Steps 3 through 6 of the FES Toolkit have led you most of the way through the design process. Step 7 will help you to think about common problems faced by FES programs and ways you can mitigate the risk that these problems will occur. This information is presented in the table below.

TABLE 4: RISK MITIGATION STRATEGIES

RISK/PROBLEM	IMPACT ON PROGRAM	POSSIBLE CAUSES	WAYS TO MITIGATE RISK
Staff turnover	• Additional stress on remaining staff • Inconsistency in production/training/monitoring activities • Slows pace of program • Financial impact (time and resources lost to find and train replacements)	• Poor management • Insufficient pay • Inadequate training • Insecurity in the area	• Hire experienced managers who are supportive of their staff • Make sure salaries are competitive with other NGOs or competitors in the local labor market • Reduce physical risks to staff as much as possible by providing secure transportation, a safe workplace, and putting in place clear and effective security protocols • Train staff to do the job they are hired to do—set them up for success

continued

TABLE 4: RISK MITIGATION STRATEGIES (continued)

RISK/PROBLEM	IMPACT ON PROGRAM	POSSIBLE CAUSES	WAYS TO MITIGATE RISK
Inconsistent quality of stoves produced through the project	• Ineffective product • Disinterest of beneficiaries (targeted population is not using/interested in your stove)	• Poor training of production staff • Low-quality materials • Insufficient oversight of production or training site • Inadequate sensitization of the targeted population	• Train staff adequately • Utilize tools and methods to standardize production process—i.e., molds • Utilize performance-based compensation for specialized producers (i.e., train/hire specialists, compensate them based on quality, not just quantity) • Provide periodic follow-up training to reinforce skills • Monitor training activities for consistency with program plan
Different dialects or languages spoken within a target population	• Increased cost—need to hire more training staff and produce additional materials to cover each dialect or language in your beneficiary group	• Outside of the control of the implementer; external causes	• Can be foreseen but not avoided • Allow sufficient room in your budget to produce the materials and train the people you need

continued

TABLE 4: RISK MITIGATION STRATEGIES (continued)

RISK/PROBLEM	IMPACT ON PROGRAM	POSSIBLE CAUSES	WAYS TO MITIGATE RISK
Delays/ problems obtaining raw materials in a timely manner	• Delays may cause cost overruns • Training on production may need to be repeated • Unpredictable supply of stoves—not enough to reach project goals within project timeframe	• Selection of an unreliable supplier • Limited availability of raw materials or stoves • Importation or security roadblocks	• Properly select your stove model for the resources that are available in your area • Plan realistically for actual delivery times • Vet your suppliers well and confirm availability of supplies • Have a back-up plan/research other possible suppliers/methods of production
Poor quality of raw materials	• Ineffective or rapidly deteriorating stoves • Disinterest of beneficiaries (stove/program is not widely embraced/accepted) • Increased program costs if forced to bring better materials from further away	• Supplier is providing poor products • Better materials are not readily available	• Select your stove model according to the resources that are available in your area • Vet your supplier well and verify the sources of your materials • Consider partial payment strategies pending inspection of goods
Poor craftsmanship on the part of producers	• Ineffective or rapidly deteriorating stoves • Disinterest of beneficiaries (targeted population is not using/interested in your stove) • Increased program costs to repair or produce new stoves	• Inadequate training materials • Employed producers and/or trainers need better training • Design is too complex	• Provide periodic follow-up training to reinforce skills • Monitor training activities for consistency with program plan • Select a stove that is appropriate to your situation and the experience of available producers

continued

TABLE 4: RISK MITIGATION STRATEGIES (continued)

RISK/PROBLEM	IMPACT ON PROGRAM	POSSIBLE CAUSES	WAYS TO MITIGATE RISK
Seasonal fluctuations in the availability of certain raw materials, which can affect the pace of program implementation	• Increased program costs if you have to bring better materials from farther away • Unpredictable supply of stoves – not enough to reach project goals • Delays may cause cost overrun • May need to select a new stove model	• Poor planning to account for available materials	• Properly select your stove model for the resources that are available in your area • Plan accordingly for predictable downtime/slow periods (schedule stove testing, end-user surveys, etc.)
Reluctance of beneficiaries to change behavior necessary to use new fuel/technology	• Improper stove use or unwillingness to use new technology • Fuel savings will not be achieved • Increased program costs if end-user training must be increased/adapted • May need to select a new stove model	• Inadequate data collection and analysis prior to selection of technology and dissemination strategy • Inadequate consultation with beneficiaries prior to stove selection and program rollout • Inadequate end-user outreach strategy	• Seek to minimize needed behavior change through appropriate stove selection/adaptation • Consult with beneficiaries to ascertain stove acceptance before roll-out; conduct focus groups after roll-out to determine needed changes • Plan adequate time/budget for end-user training to encourage behavior change • Demonstrate stove benefits before and during roll-out • Encourage participation of local enthusiasts in education activities

continued

TABLE 4: RISK MITIGATION STRATEGIES (continued)

RISK/PROBLEM	IMPACT ON PROGRAM	POSSIBLE CAUSES	WAYS TO MITIGATE RISK
Improper stove use	• Fuel savings will not be achieved • Emissions reductions won't be realized • Stoves could be damaged and lose credibility	• Inadequate beneficiary training • Inadequate training of program staff • Lack of beneficiary monitoring and follow-up • Poor stove design • Poor stove choice	• Provide regular opportunities for training; use CCTs as a training refresher • Conduct focus groups to see what changes in training, stove design, and/or fuel use can be incorporated into the program • Identify and publicly reward end-users who demonstrate exemplary skills
Inequitable stove distribution	• Could cause disruption to the program if perceived as favoring particular populations	• Camp or settlement leaders or program employees favor certain beneficiaries over others • Inadequate understanding of site population dynamics	• Conduct thorough analysis of conditions at the program site when developing dissemination strategy • Develop and explain the dissemination strategy to camp/settlement residents and community leaders and residents • Monitor stove distribution and record recipients to prevent against corruption/favoritism

STEP 8

PREPARING A FULL PROPOSAL

Steps 3-7 have guided you through the process of gathering information to design your FES program. Some or much of this information will be needed to draft a full proposal for submission to OFDA per the OFDA *Guidelines*: http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/resources/pdf/updated_guidelines_unsolicited_proposals_reporting.pdf.

Listed below are some of the most relevant sections that must be included in the final proposal and the types of information that you should include for each section. Note that this represents only a sub-set of the information that needs to be included in a full proposal. All of the information requested in the OFDA *Guidelines* should be provided, and the amount of detail that should be provided for each section will be considerably greater in a proposal that has FES as its only activity (an FES stand-alone proposal).

Needs Assessment Summary

- The nature of the problem and the need for the proposed FES intervention
- Description of the current situation regarding stove and fuel use and fuel supply
- Profile of the needs and capacities of the targeted population as they relate to the FES program

Justification for Intervention

- Explain why the FES program should be undertaken at this particular site
- Explain why the FES program needs to take place now
- Describe why your organization is qualified to undertake this activity
- Explain why OFDA is a logical donor for this activity

Technical Description

- Beneficiary numbers: how many people will be targeted, why, and how they will be chosen
- List the sector(s) under which the FES activity will fall
- List the keywords that are applicable to your program (e.g., Capacity Building/Training, Gender Relations, Environmental Management, etc.) and how the chosen topics are integrated into your program
- List the sub-sector(s) under which the FES activity will fall
- Describe the technical design of your program, including the type(s) of stove chosen and why, how it will be provided or manufactured; and program staff members and responsibilities
- Explain how the program will be implemented
- List the mandatory indicators for the chosen OFDA sub-sector (if none apply for a stand-alone program, consult with OFDA staff to determine which FES-specific ones would be relevant)
- List the indicators to be used for each objective associated with your FES program (See Step 11 for additional guidance)
- Describe how the indicators will be measured and reported on

Transition or Exit Strategy

- Describe what steps will be taken to ensure, to the degree possible, that the FES activities will continue after the life of the program

Monitoring and Evaluation

- Describe how the FES program will be monitored (see Step 11 for additional guidance)
- Provide measurable targets for each indicator
- Describe the plans for internal and/or external evaluations of the FES activities

Budget

- Provide separate line items for the major costs of the FES activities if part of a larger program; provide all the sector and sub-sector details requested in the OFDA *Guidelines* if FES activities will be a stand-alone program

STEP 9

IMPLEMENTING YOUR FES PROGRAM: THE PILOT PHASE

Now that you have completed your project design, Step 9 will guide you through the pilot phase of program implementation. A pilot phase before the full roll-out is important to help identify potential problems and to ensure that users will be satisfied with their stoves and will be able to use them correctly.

CONDUCTING THE PILOT PHASE

With the data you collected from your site and household surveys in Step 3 and the guidance presented in Steps 4 and 5, you and your stove expert should be able to choose at least one stove model that fits the needs of the targeted population and represents a realistic choice that takes into account the available resources and logistical considerations. If time and resources allow, it's advisable to select two or three models, and then narrow the choice after you conduct some initial field testing during the pilot phase of the project. (Be sure to budget for this phase in your proposal).

TASK 1: MEET WITH THE COMMUNITY The first task of the pilot phase is for your team to set up meetings with local community groups to introduce the selected stove(s) and the stove program. This will provide an opportunity for you introduce your team, sensitize the community to the program, and gauge the initial reactions of the targeted community. During this step, your stove team should conduct several cooking demonstrations using the new stoves to cook a typical local meal. The demonstrations should occur in public sites over the course of a week or two so that the community has multiple opportunities to see the new stoves in use. The demonstrations will also help generate interest in the program and motivate people to participate.

TASK 2: CONDUCT TRIAL COOKING TESTS Cooks who demonstrate interest in the demonstrations may be asked to volunteer to participate in Controlled Cooking Tests (CCTs). A detailed explanation of the CCT, and instructions on how to conduct it, may be found in Step 9 Tool A. Essentially, the CCT is a way to compare the performance of different cooking technologies when cooking the same meal. Conducting some CCTs during the pilot phase will enable you to both obtain some preliminary data on potential fuel savings from selected FES, and gauge how easily your intended beneficiaries might be able and willing to adapt to a given stove (see Step 9 Tool B, CCT Structured Observation Data Sheet).

TASK 3: HOLD FOCUS GROUPS After you conduct the CCTs, you should hold focus groups with the participants to learn what they liked and didn't like about the stoves, especially compared to the cooking method they are currently using (see Step 11 Tool A). It is critical to obtain such feedback from your target population BEFORE you begin to produce or purchase large quantities of stoves. The information you obtain from the CCTs combined with your observations of the tests and feedback you obtain from the focus groups, will help you determine which stove model to promote, whether any design changes are needed to make it acceptable to your target community, and what types of issues to focus on in your training and outreach to end-users. Beneficiaries will not always select the most fuel-efficient stove as their favorite, and may express strong preferences for stoves with specific physical attributes (i.e., height, weight, ability to accommodate large pots, etc.) and fuel preparation/stove-tending requirements. You must weigh all of these factors before beginning full-scale implementation of your project. This initial round of CCTs and focus groups should be managed and conducted by your stove expert, who in turn may teach other members of your staff how to conduct these activities for use throughout the life of the project. The stove expert should also supervise and approve any changes made to the stove to accommodate beneficiary requests; even small changes to stove dimensions can have a significant impact on stove performance.

TASK 4: FINALIZE IMPLEMENTATION PLANS The activities conducted under tasks 1-3 should enable you to finalize some of the critical components of your implementation strategy: selection of the stove(s) you wish to promote (incorporating needed changes);

stove production or acquisition strategy; stove dissemination strategy; and end-user outreach strategy. To a large extent, the production, dissemination, and outreach strategies will be driven by the type of stove you are promoting and the potential behavior changes associated with the use of the new stove.

SETTING UP AND STAFFING A PRODUCTION FACILITY

If you have chosen to manufacture or assemble stoves locally, the production facility is the site where the FES will be produced. Depending on the selected model, full production or partial production will take place here (some components such as metal grates, or ceramic combustion chambers may be commercially produced elsewhere). Selecting production staff will depend upon the skills you need for the stove model/parts you intend to produce.

FES programs that incorporate production components should include the use of standardized tools and measurements in production, and have on-site production quality staff supervising the production process. OFDA strongly encourages a centralized production approach utilizing specially trained artisans to construct/assemble stoves rather than a traditional training-of-trainers approach that involves each recipient making his/her own stove. Research shows that organizations employing the latter approach often have difficulty ensuring quality control over stove production, with negative impacts on stove (and program) performance. Any program seeking to use a training-of-trainers approach for stove production must set up a rigorous quality control program that should be described in the project proposal.

Regardless of the type of stove you will produce, warehousing and inventory systems should be in place to track production and distribution of the stoves, and to forecast how many stoves will be needed as the program progresses. A sample production log is provided in Step 9 Tool C. If you create a production facility, it should be in close proximity to distribution sites (see Step 10 for more information on distribution).

STEP 9

TOOLS & RESOURCES

> Step 9 Tool A: Controlled Cooking Test Protocol

> Step 9 Tool B: CCT Structured Observation Data Sheet

> Step 9 Tool C: Production Log Template

TOOL A: **Controlled Cooking Test Protocol**

Summarized CCT protocol [with USAID modifications] courtesy of Aprovecho Research Center and adapted from the CCT Protocol developed for the Shell Foundation's Household Energy and Health Programme

Summarized Controlled Cooking Test (CCT)

The controlled cooking test (CCT) is designed to assess the performance of a new stove relative to the common or traditional stoves that the improved model is meant to replace. Stoves are compared as users perform a standard cooking task, and local cooks can provide later feedback on whether the new stove is to their liking. For this reason, the CCT should be done during the pilot phase of a project when you are contemplating the introduction of a new stove. The initial round of CCT testing should be conducted by your stove expert, who may then train your monitoring staff to conduct additional tests at later dates.

The CCT can be used to do the following:

- Compare the amount of fuel used by different stoves to cook a typical food or meal
- Compare the time needed to cook that food
- Observe the ease/comfort with which cooks use the new stove

While the CCT will give you some indication of how much fuel (if any) a new stove may help your beneficiaries save, to determine whether the tested stoves would be accepted into the community you must pair the CCT with information gathered from the structured observation sheets accompanying this tool and focus group discussions (see Step 11 Tool A).

Cooks participating in the CCT should be experienced in using each stove to be tested. It is recommended that the cook use the stove for at least two weeks before the testing; if this is not possible, then the cooks must, at a minimum, receive training on how to use

each stove properly. It is best that the tests be done with each cook in an isolated place in as casual and normal an environment as possible. The tester should not suggest to the cook how to use the stove, or give other instructions.

Each stove/cook combination should be tested three times. It is best for a local cook to test the traditional method three times and the new stove three times. A complete test series (3 improved and 3 traditional) with three separate cooks should be considered the minimum number of tests. Then, based on the difference between the traditional and improved stoves found from the results of the testing series of the first three cooks, the number of additional test series will be decided. More cooks should be used until a statistical t-test shows a 95% confidence. Statistically speaking, less difference between the stoves will require more cooks to prove that difference. OFDA recommends that you test a minimum of five cooks.

Supplies Needed

- A normal mix of firewood, enough to test all of the stoves, should be found and allowed to air dry. Make sure that all the wood is uniform in size and moisture content. The fuel may be divided into pre-weighed bundles to save time during testing. Testers can take pre-weighed bundles to the testing site, then return with the remaining fuel to the scale. Or each tester can take a scale with him/her (this is the preferred method).
- Gather enough food and water for all the tests that will be done. The food should be representative of a typical meal. Food can be pre-weighed to save time or a scale can accompany the tester to the testing site.
- Cooking pot: the same type (size, shape, and material) of pot should be used to test each stove
- Lids should be used if they are commonly used by local cooks
- Digital scale: 10-kg capacity and 1to 2-gram accuracy (Step 12 Tool A contains contact information for suppliers of this equipment)
- Heat-resistant pad to protect scale when weighing hot charcoal
- Timer
- Small shovel/spatula to remove charcoal from stove for weighing
- Metal tray to hold charcoal for weighing
- Heat-resistant gloves

CCT Procedure

The stove tending and cooking should be done by a local person who is familiar with both the meal that is being cooked and the operation of the stove to be tested. The cook should try to perform each test in the same way [i.e., do not encourage cooks to cook faster, more efficiently, etc.]. If the results of each cook's three tests are very different the average will not be statistically significant and more tests will be required. We recommend starting with three complete series of tests for each stove that is being compared.

STEP 1 The first step in the CCT is to have local people choose the food to be cooked. This should be done well ahead of time, to ensure that sufficient ingredients can be obtained for all of the tests. If the stove is designed for cooking all types of food, then a typical amount of food should be decided upon. More than one dish can be prepared, but it is best to keep the testing simple. If the stove is designed for specific foods, for example making tortillas, chapattis, or other flat breads, then testers decide the amount of food on which to base the test.

STEP 2 After deciding on a cooking task, how the food is to be prepared should be described and recorded in a way that both stove users and testers can understand and follow. This is important so that the cooking task is performed similarly on each stove. If possible, include a specific way to measure when the meal is done, like "the skin comes off the beans" or the "the rice is soft." Recipes and cooking instructions should be recorded on the Data and Calculations form provided on the flash drive.

The table on the next page gives an example of how to record the measurements and determine the cooking method so that the chefs are able to conduct the CCTs in a uniform manner.

INGREDIENT	INITIAL MASS	COOKING METHOD
Rice	1,434 g	1. Fry the onion in the oil until soft and browned
Water	4,158 g	2. Add fresh chopped tomatoes, bullion, spices, and salt
Tomatoes	330 g	3. Cook until fully blended
Tomato paste	65 g	4. Add tomato paste and a little water
Onion	66 g	5. Add remaining water
Oil	184 g	6. Bring to a boil
Jumbo (seasoning bullion)	41 g	7. Add washed rice
Garlic	37 g	8. Simmer until rice is soft
Spice	29 g	
Salt	3 g	

STEP 3 You should now be ready to begin the actual tests. Record local conditions as instructed on the Data and Calculation form.

STEP 4 Do all of the washing, peeling, and cutting as described by the cooking directions recorded in step 2 above. Record the mass of each food in the Data and Calculation form.

STEP 5 Start with a pre-weighed bundle of fuel that is more than the amount that local people consider necessary to complete the cooking task. Record the weight in the appropriate place on the Data and Calculation form.

STEP 6 Starting with a cool stove, the cook lights the fire in the normal way. Start the timer as soon as the fire is lit and record the time on the Data and Calculation form.

STEP 7 While the cook prepares the meal, the tester records any observations (see Step 9 Tool B) and comments that the cook makes (for example, difficulties that they encounter, excessive heat, smoke, instability of the stove or pot, etc.). The tester does not take part in the cooking but should remain at a distance, quietly observing.

STEP 8 When the cooking is finished, record the time in the Data and Calculation form.

STEP 9 Remove the pot(s) of food from the stove and weigh each pot with its food on the digital scale. Record the weight in grams on the Data and Calculation form.

STEP 10 Remove the unburned wood from the fire and extinguish any live embers with water. Knock the charcoal from the ends of the unburned wood. Weigh the unburned wood from the stove with the remaining wood from the original bundle. Place all of the charcoal in the designated tray and weigh this too. Record both measurements on the Data and Calculation form. (If it is not common for cooks to re-use the unburned charcoal and it instead goes to waste, you may choose to record zero in the Data and Calculation sheet.)

STEP 11 The test is complete. Cooks and testers may now enjoy the food that was cooked, or begin testing the next stove—each stove should be tested at least three times. Wait between tests until the stove is cool. Testers can alternate between the traditional and new stove.

Analysis

The Data and Calculation form includes specific consumption (the fuel used to produce a liter of food) and the time to prepare the food. It is necessary to calculate the average of three tests for each stove and compare the results. In addition, stoves should be evaluated on the basis of the observations made during each test.

The full text version of the CCT protocol and Data and Calculation Spreadsheets can be found online at www.aprovecho.org.

After the CCT is complete, a focus group discussion should be held with the cooks to learn their opinions on the stoves (see Step 11 Tool A).

TOOL B: **CCT Structured Observation Data Sheet**

This tool was created by Berkeley Air Monitoring Group to support USAID-funded cookstove evaluations in humanitarian settings.

This form can be completed by staff implementing the CCT to capture relevant information on how the cooks are using their stoves. This data would not otherwise be directly captured by the CCT, but can later help interpret the results and inform focus groups. The form is designed to be completed in "real time" –i.e., during the observation, as the CCT progresses. The form may need to be adapted to the specific models you are testing (for example, some stoves might not have skirts). Extra columns and rows are left blank in the tables so that you may insert issues which may arise during a particular observation.

A. Basic data

A.1 Date: _____ A.2 Time: _____ A.3 Location: _____

A.4 Stove name: _____ A.5 CCT number: (1, 2 or 3): _____

A.6 Cook ID: _____ A.7 Fieldworker name: _____

B. Events logging

1. FUEL USE OBSERVABLES	**B1.1** REFUELLING	**B1.2** NEAR EXTINGUISHING	**B1.3** RELIGHTING WITH MATCH	**B1.4** EXCESSIVE BLOWING REQUIRED TO MAINTAIN FIRE
Events log (tally/count incidents)				
Comments (e.g., typical causes of incidents observed)				

B. Events logging *(continued)*

2. STABILITY OBSERVABLES	**B2.1** POT SLIPPED - CLEARLY UNSTABLE WITHOUT BEING HELD	**B2.2** STOVE UNSTABLE AND REQUIRED ADJUSTMENT	**B2.3** STOVE SKIRT SLIPPED	**B2.4** OTHER
Events log (tally)				
Comments (typical causes)				

3. SMOKE OUTPUT	**B3.1** PARTICULARLY SMOKY PERIOD (E.G., AT LIGHTING)	**B3.2** PARTICULARLY CLEAN BURNING PERIOD		
Events log (tally)				
Comments (typical causes)				

IMPRESSIONS ON LEVEL OF CONFIDENCE AND EASE USING THE STOVE

This reflects the observers' impression of how confident and comfortable the cook feels using the stove. ONE letter and ONE number should be noted, to describe both the apparent nature and the physical wellbeing of the cook.

CODING SYSTEM

	IN CONTROL	TENTATIVE	CONFUSED	PHYSICALLY RELAXED	PHYSICALLY AWKWARD	PHYSICALLY STRAINING
CODE:	**A**	**B**	**C**	**1**	**2**	**3**

DATA COLLECTION TABLE

	RANK (ONE letter and ONE number)	**COMMENT** (any supporting information/justification)
C1.1 DURING LIGHTING		
C1.2 DURING COOKING (RELATED TO COOKING PROCESS & UTENSILS)		
C1.3 TENDING THE FIRE DURING COOKING (RELATED TO THE FIRE ALONE)		
C1.4 ADJUSTING HEAT		
C1.5 TAKING POT OFF AND PUTTING OUT FIRE		
C1.6 OTHER: _____ _____		

Comments

Record here any comments the cook makes during the test:

TOOL C: **Production Log Template**

This is a template of a production log that can be used for keeping track of materials used for the production of mud stoves, as well as the number of stoves produced. Sample quantities have been inserted in the materials log boxes to demonstrate how they may be used to make sure the necessary materials are on site and ready for use. You can adapt this template to suit your own production process. An electronic version is provided on the flash drive.

Start of week materials log
DATE:
CHECKED BY:
ORDER PLACED BY:

	Raw Materials		
	CLAY/MUD	STRAW	WATER
NEED	50 kg	10 kg	25 liters
HAVE	50 kg	10 kg	25 liters
ORDERED (*specify qty ordered*)	0	0	0

Start of week materials log
DATE:
CHECKED BY:
ORDER PLACED BY:

	Raw Materials		
	CLAY/MUD	STRAW	WATER
NEED	50 kg	10 kg	25 liters
HAVE	20 kg	2 kg	25 liters
ORDERED (*specify qty ordered*)	30 kg	8 kg	0

	QUANTITY CLAY MIXTURE PREPARED	# OF STOVES MOLDED	QUALITY CHECK 1 (molded stoves)		# OF STOVES DRYING	QUALITY CHECK 2 (dried stoves)			# STOVES SHIPPED TO DISTRIBUTION CENTER
			# with correct measurements	# incorrect and discarded		# with correct measurements	# without cracks	# discarded for defects	
MON									
TUES									
WED									
THU									
FRI									
SAT									
SUN									

STEP 10

IMPLEMENTING YOUR FES PROGRAM:

STOVE DISSEMINATION AND END-USER TRAINING

I. SELECTING A DISSEMINATION STRATEGY

To a large extent, your dissemination strategy will depend upon the type of stove you select and where it is produced. For instance, if you are promoting a non-portable (fixed) stove that is attached with mud to the floor of the recipient's home, your dissemination strategy has already largely been decided. However, if you will be distributing portable stoves made at the site or elsewhere, you will need to craft a detailed dissemination strategy. The strategy should address the logistics of stove distribution as well as any end-user training necessary to ensure that the stove is used properly.

Factors to Consider

Regardless of what stove you promote (even a fixed stove), you must address the following questions before you begin stove distribution:

1) How will stove recipients be selected?
2) How will equitable distribution be ensured?
3) How will the distribution strategy be explained so that the community understands and accepts it?

There is no one best way to distribute stoves; different methods can be adopted successfully, depending upon the particulars of your program and site. As a first step, you should consult with the camp/settlement management and key community groups to draft a strategy. These entities can help you prioritize vulnerable recipients where possible and appropriate (should you wish to first distribute stoves to widows, orphans, and the disabled), and also to organize distribution efforts. Many programs distribute stoves by block or geographical area of a site. Whatever the basis of distribution, you must explain it to the community and guard against abuse or the perception that some residents are

being favored over others. To help prevent favoritism or corruption, your staff should register all stove recipients by name, the date they received their stove, and residence location. This information will be crucial for follow-up monitoring and training, and enable you to track indicators and success toward your program objectives.

Distribution Logistics

There are two primary ways to distribute stoves: through a centralized distribution point; or via multiple outlets. Generally speaking, it is probably easier to manage distribution from a central site, especially if stove production and/or assembly are part of your program. If you are promoting fully manufactured stoves, a decentralized, multiple-distribution outlet strategy may be feasible. In both cases, however, your staff must register accurately all stove recipients (See Step 10 Tool A for a sample distribution log), and you must have a parallel strategy for educating stove recipients how to use their stoves. End-user training is discussed in more detail later in this step.

Centralized Distribution

When distribution is centralized at a specified site, stove recipients can be invited to come there to receive their stoves and be trained on proper stove operation at the same time. Depending on the stove selected, the recipients either will have to construct/assemble their stoves under the guidance of trainers, or they will be given a fully constructed stove. Care should be taken to make sure that an appropriate number of recipients are selected at any one time to receive stoves, in order to ensure that the distribution process is orderly, everyone is registered, and everyone receives the requisite training.

Decentralized Distribution

With decentralized distribution (distribution at multiple sites), stoves are delivered to various locations around the camp/settlement, and distributed to users living in the vicinity. This strategy is more complicated, since logistical, storage, and security issues must be addressed at each distribution site. However, if a program has a large number of stoves available for distribution, this method may be the best way to disseminate them quickly. Care must be taken to ensure that registration and training issues are addressed at each distribution site.

In some situations, you may wish or need to create a fuel distribution strategy in coordination with your stove distribution strategy, especially if you are introducing a new fuel or require a traditional fuel to be prepared in a new way. The program should consider ways to minimize the burden on end-users of adapting to the new fuels or methods of fuel preparation in order to maximize FES uptake amongst the population. For instance, some FES models of require very small pieces of firewood in order to operate effectively. You could consider hiring local people to do the upfront chopping of wood required to prepare the fuel. (In this case you would need to create a transition strategy that encourages/enables end-users eventually to take on this task themselves.) Alternatively, this service could be provided for a small fee by local residents. Another option would be to include a chopping instrument (a small axe, for example) along with the stove, to help residents split their wood.

II. TRAINING BENEFICIARIES HOW TO USE THEIR NEW STOVES

It is extremely important to teach people how to use their new stoves properly, and to follow up the initial training session with additional opportunities for training throughout the life of the FES program. Evaluations conducted by OFDA and other funders revealed that FES program implementers frequently underestimate the need for end-user training, with detrimental impacts on their programs' effectiveness. The rest of Step 10 is devoted to helping you understand the types of training that should be provided and the ways in which they might be delivered.

Training Topics

Although you are free to determine the specific combination of topics your program will cover in a training program, at a minimum, you should include the following:

- Specific guidance to new stove users on how to use their FES safely
- Specific guidance to new stove users on how to use their FES effectively (for example, how to prepare fuel, how to use energy-efficient techniques, how to tend the fire, how to adapt cooking behaviors, etc. See Step 10 Tool B for tips on Fuel-Saving Cooking Practices)

- Specific guidance on how to maintain (and in some cases, repair) the stove
- Explanation of the potential benefits of using FES (to health, environment, personal finances, etc.)
- Specific guidance on what NOT to do with the new FES (i.e., change stove dimensions, etc.) and how use of the stove may differ from the traditional way of cooking
- Explanation of how to use supplemental cooking technologies (if applicable)

Other topics that might be of interest include:

- Integrating FES with water/sanitation training to discuss the concept of "healthy kitchens"
- Explaining the potential health impacts of indoor air pollution, especially on children, and discussing mitigation options in addition to FES (i.e., remove infants/young children from the cooking area, etc.)

Once you have selected outreach staff, the outreach coordinator and the stove expert must spend at least 2-3 weeks training them, so that they in turn will be able to teach beneficiaries. The training should include the topics above and any other relevant topics, such as the technical operating principles of the stove and the rationale for choosing the selected stove model. During the training sessions, numerous demonstrations should be undertaken to ensure that all outreach staff have completely mastered the use of the stove and will be able to answer any questions from the beneficiaries. Each outreach staff member should be given a stove to use daily for her/his own meal preparation for several weeks prior to full-scale distribution. During the training weeks, the program staff should make random visits to the outreach staff's homes to check that they are using their stoves correctly. Outreach staff who are not using the stove themselves will weaken the credibility of the project. Providing outreach staff with specialized clothing (for example head scarves, t-shirts, etc.) that easily identifies them to the beneficiary population can help promote the program and build pride amongst the staff.

III. WHERE TO CONDUCT BENEFICIARY TRAINING

Where you conduct the beneficiary training can be an important part of your communication strategy. Some programs, particularly those that rely on centralized production and distribution approaches, may include the establishment of a dedicated stove training center. This is where all of the stove distribution, and much of the end-user training, will take place. Some issues to consider when selecting the training site include:

- Obtaining approval from local authorities and camp/settlement management on the location of the training site and encouraging the participation of camp leaders/management in activities conducted at the site
- Selecting a training site that can be conveniently accessed by all blocks/areas within the site so that all participants are able to attend the training. If the training center is too far from many of the residences, you should consider establishing more than one training site. Otherwise, many stove recipients may not be able to attend training and/or receive stoves.
- Strategically locating the training site to be in close proximity to the production site to minimize transportation costs and logistical complications
- Evaluating the security of the training site and its surroundings, since there will be considerable traffic through the training site; It is important to secure the safety of the individuals who are participating in the FES program, as well as to secure stove materials against theft.
- Evaluating the road infrastructure between the production site and training center since poor roads can slow down the delivery of materials and supplies

Setting Up a Stove Training Center

The training center should be established to provide a community forum to exchange experiences, provide user training, conduct monitoring and evaluation activities, and other activities associated with the FES program. Practical aspects to consider when establishing the training center include the following:

- The training site should have one exit and one entry in order to control the crowd and conduct the training efficiently. Too much movement within the training center can lead to disorganized training sessions that may prevent stove recipients from receiving quality instruction.

- The training center should have a flag on the roof or a banner that clearly indicates the training center is for "FES," perhaps designated by a picture of a stove, so that everyone in the camp or settlement will know the purpose of the center. This will also give the project its own identity.
- The training center should be able to accommodate stoves in use on a daily basis, in order to demonstrate how the stove works and allow hands-on training with the selected FES model (and any supplemental technologies).

IV. REACHING BENEFICIARIES

The length of the initial training for stove recipients will depend upon how significant a change in behavior is required to use the new FES. Generally speaking, the greater the departure from traditional methods of cooking (and fuel preparation), the more training will be required. Regardless of the technology, you should try to follow up with a home visit within one week of the initial training. It is NOT sufficient to spend an hour explaining how to use the stove and consider your work done. Much research in both humanitarian and development contexts shows that enabling—and convincing—end-users to use their new stoves to their fullest potential requires a considerable investment of staff time and resources. You should plan to spend at least a half-day on the initial stove training, with a planned series of follow-up household visits complemented by public demonstrations.

During any training or demonstration, all participants—men and women—should be made to feel comfortable enough to feel free to ask questions. While the primary purpose of any training activity is to impart information, it is important that the program as a whole, and the trainers specifically, use their creativity to design events and training sessions that promote the proper use of FES. For instance, hiring local residents to create drawings and posters that provide simple visuals of the "dos" and "don'ts" of stove use can be a very useful and popular way to educate beneficiaries. These materials can also be used to decorate their homes. Avoid excessive amounts of text in order for illiterate residents to access the maximum amount of information possible. Printed materials should be translated into the local language(s). Examples of illustrations from various countries that have been used to demonstrate stove use are provided in Step 10 Tool C. It is important

to balance verbal instructions with visual tools and demonstrations, as well as with hands-on training on how to prepare fuels or tend the fire, so that your key messages will be imparted successfully—and beneficiaries will feel confident in their skills and be convinced that they should change their behavior.

A few activities that can increase local interest in the stoves and training activities include:

- Allowing beneficiaries to personalize their stoves, for instance by painting or drawing on them; each resident could even put his/her name on the stove. Personalizing a stove can create a congenial atmosphere and instill pride in ownership of the stove that can have a positive influence on the way recipients maintain and use their stoves. Ensure, however, that these personalized touches do not negatively affect the operation of the stove.
- Holding cooking demonstrations at public sites such as markets, schools, community centers, and places of worship (with permission, of course) to disseminate information about the program, the stoves, and their benefits over traditional cooking methods. Participants can be invited to taste/share the food cooked, or comment on the amount of smoke generated by the new stove as compared to a traditional stove or open fire.
- Including music, skits, or other cultural activities in public demonstrations to create interest amongst the local population and sensitize them to the program and important characteristics of FES.
- Organizing friendly competitions amongst the stove recipients to assess who has constructed the best stove, who can cook a meal using the least amount of fuel, etc. Small prizes may be given to the winners.

Be sure to keep records on the events (and results) that you conduct, both to inform your training strategy, and to generate information for inclusion in the quarterly and/or annual reports required by your funding agreement.


fes

STEP 10

TOOLS & RESOURCES

> Step 10 Tool A: Distribution Log Template

> Step 10 Tool B: Fuel-saving Cooking Practices

> Step 10 Tool C: Sample Outreach Materials

TOOL A: **Distribution Log Template**

Below is a template of a distribution log that can be used for keeping track of stoves in your possession, the number of stoves you distribute, who receives them, and any training provided. Recipient information will be important to have for ongoing monitoring and evaluation. You can adapt this template to suit your own dissemination procedures; an electronic version is provided on the flash drive. You will need to create and maintain a separate training schedule and log, customized to the type of training that you will be conducting.

START-OF-DAY STOVE INVENTORY

Date: _____

Checked by: _____

# of stoves ready for distribution	
Anticipated # of recipients today	
Shortage (if applicable) and # needed from production facility	

END-OF-DAY STOVE INVENTORY

Date: _____

Checked by: _____

Order placed by: _____

# of stoves distributed	
# of stoves ready for distribution	
Anticipated # of recipients at next distribution	
# of stoves needed from production facility	

DATE	RECIPIENT NAME	RECIPIENT LOCATION	# OF STOVES RECEIVED	TRAINING RECEIVED AT TIME OF DISTRIBUTION (YES OR NO)

TOOL B: **Fuel-Saving Cooking Practices**

The ways in which a cook uses his/her stove and utensils, prepares the fuel and the meal ingredients, and plans the household meals can impact the amount of fuel that is consumed. Below are suggested actions that cooks can take to maximize the efficiency of their stoves and reduce fuel consumption. These actions can be transformed into education tools for your training activities (posters, handouts, etc.), enhanced by illustrations and/or photographs.

Pot management

- Cover pot with a tight-fitting lid when not stirring or adding food, to keep the heat inside of the pot (and external debris out). Put a heavy object on top of the lid if it is not tight enough.
- Use a pot size that corresponds to the quantity of food that you are cooking (for example, do not heat a full pot of water if you are only making a small cup of tea).
- Use a pot made of the best material for the food you are cooking (metal pots heat quickly but retain little heat, and thus are good for boiling or quickly frying food; clay pots retain heat and are good for slowly cooking such foods as beans or stews).
- Use a pot size and shape appropriate for use with your stove to the extent possible (i.e., not too large or small; use pots that come with the stove kits, if provided).
- If two pots are available, begin warming a second dish by placing it on top of the main pot.

Stove/fire management

- Do not overstuff the stove with fuel. This makes combustion less efficient by restricting air flow, which results in increased fuel consumption. It can also cause excess smoke production and may even damage the stove.

- Position your stove in a place where it is protected from strong winds that may cause the fire to burn too quickly or produce excess smoke.
- Clean and maintain your stove as instructed; a dirty chimney, excess ashes in the combustion chamber, or visible cracks all may reduce stove performance.

Fuel management

- Dry firewood before using it as fuel. Dry fuel burns more efficiently and completely, and releases less smoke.
- Cut firewood into small pieces to manage fuel consumption better. Smaller pieces burn faster and more completely than large logs.
- When you are done cooking, completely extinguish the fire rather than allowing it to burn out on its own. This can be done by stirring the wood and ash to extinguish all flames, and then sprinkling water over the coals, or mixing the embers with dirt.

Meal planning

- Presoak such hard foods as beans and some grains (faro, rye berries, millet) in water for several hours before cooking to reduce the cooking time needed.
- Use tenderizing methods, such as filtering water through ash, to cook beans.

Supplemental cooking technologies

- Use haybaskets or another type of heat-retention cooker like those described in Step 5 of this Toolkit.

TOOL C: **Sample Outreach Material**

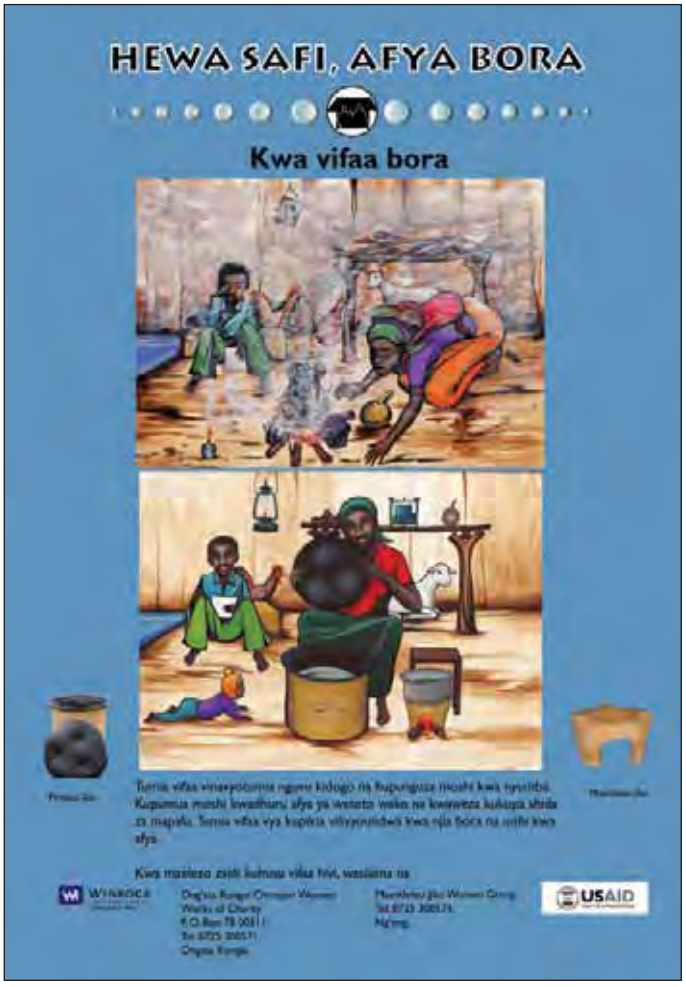
Garnering initial interest and support for your FES can be difficult, particularly if you are introducing a cooking technology that is significantly different from the traditional methods your target beneficiaries are using. To maximize your program's reach and impact, make use of existing community resources and information channels to help spread your message about the benefits of FES. Start the process of rallying interest and support from wherever it can be found within the community. Some ideas to get you started include:

- Inform local authorities about your intentions and request recommendations of potential partners.
- Contact NGOs and community-based organizations to explain what you would like to do and request assistance in making information about your project and its benefits available to a wider audience.
- Foster partnerships with health clinics, religious institutions, and schools if possible. These are excellent places to post and share information about the benefits of your program, and where you can conduct demonstrations of your FES.
- Produce educational materials that respond directly to information needs (posters and flyers) and post them in such common gathering places as water or food distribution sites, camp management headquarters, etc.

Public demonstrations or competitions can also be a useful way to get people excited about your program and reinforce efficient cooking practices. During the public demonstrations, include music, skits or other cultural activities that will create interest amongst the local population and sensitize them to the program and important characteristics of FES. When producing printed materials, try to find a local artist or illustrator in the community who can design images in a way that is appropriate and meaningful to your beneficiaries.

Included in this tool are examples of posters and flyers that have been used in FES programs in Bangladesh, Peru, Kenya, and India. Although these materials were not developed for humanitarian contexts, you can use them as inspiration for your own program. Note that all of the images on the next page demonstrate a typical home before and after the family receives a fuel-efficient stove. The "before" images show a traditional stove or open fire producing a lot of smoke; the "after" images show a cleaner, safer environment with a happier family. Also note that the example from Kenya depicts a family using both a fuel-efficient stove and a haybasket to prepare the meal.

This poster from Bangladesh says, "Exposure to kitchen/cooking smoke increases the risk of diseases (pneumonia, bronchitis, cancer, etc.)."



This poster, designed for an FES program in Kenya, says "healthy homes, happy families" in Swahili.

Designed for an FES program in the Peruvian Andes, this poster includes photos of qualified stove installers so that illiterate residents can identify and contact them.

This brochure seeks to convince men and women of the benefits of fuel-efficient stoves. The slightly different approach for each gender reflects different responses from the sexes to various surveys. Both approaches seek to convey such benefits as saving money, saving time, and improving health. Courtesy of Shell Foundation Smoke-less Stove Campaign

TRAINING OUTREACH

Visual materials are also useful to reinforce the information and techniques that are demonstrated during stove training sessions. It may even be beneficial to make take-home booklets with the most important instructions or messages so that each stove recipient has a daily reminder of proper stove use and maintenance. Songs or rhymes can be written to help users remember simple steps or sequences, such as fuel preparation or energy-efficient cooking behaviors.

Public activities or demonstrations can also be used as ongoing training opportunities to reinforce the information shared in formal training sessions. Cooking demonstrations in such public areas as markets, schools, or community centers will demonstrate what your FES can do, and allow people to taste food cooked on the stove. These activities also will be an excellent opportunity to gather informal feedback on attitudes about your stove model that can feed into your ongoing monitoring and reporting efforts.

Below are materials that were used to complement end-user stove training in a USAID-funded program in Peru.

This illustration demonstrates the need to split logs into small pieces for use in fuel-efficient stoves.

This illustration demonstrates the proper way to load the fuel and light the fire.

STEP 11

MONITORING, TESTING, AND REPORTING

Strong monitoring and evaluation protocols need to be established for an FES program, and should include methodologies and tools that will be used throughout the life of the program (not just at the beginning and end). The program monitoring plan should incorporate a variety of both qualitative and quantitative data collection methods. This step provides guidance on what to include in a program monitoring plan, both required and suggested indicators, and data collection methodologies that are acceptable for OFDA FES programs. Since it may take some time before large-scale production and distribution of stoves can begin, OFDA recommends that you provide timely updates of any challenges or obstacles that might hinder project progress, consistent with the reporting requirements language in your agreement.

PROGRAM MONITORING PLAN

The FES program monitoring plan should correspond directly to the information provided in the FES program description in your proposal, including the objectives of the FES program, specific activities, and planned indicators. OFDA encourages strong monitoring plans that will facilitate prompt and accurate reporting of quantitative and qualitative data. OFDA uses this information to evaluate whether its resources are being used effectively and efficiently. The monitoring plan should specify the following:

- The source, method, and time frame for data collection
- The personnel identified to undertake monitoring-related tasks
- The quality assessment procedures that will be used to verify and validate the measured values of actual performance

- The known monitoring limitations, the impact the limitations may have on program implementation, and the plans for addressing these limitations, as applicable
- The plans for data analysis, reporting, review, and use
- A list of proposed indicators with a baseline and measurable target for each indicator

CHOOSING INDICATORS SPECIFIC TO FES PROGRAMS

As stated in Step 2 of this Toolkit, you must place your FES program under a standard OFDA response sector and sub-sector for which there are required indicators listed in the OFDA *Guidelines for Unsolicited Proposals and Reporting*. If your FES program is part of a larger, multi-activity program in the chosen sector, you must report on the required OFDA sub-sector indicators, which measure the progress of the overall program. However, since there are no required indicators provided in the OFDA Guidelines that are specific to FES programs (though they may be added in the future), OFDA suggests that your organization voluntarily measure, track, and report on a variety of indicators that correspond to your stated FES sector- and non-sector-related objectives. In this way, you will be better able to demonstrate the impact of your FES program. Some suggested indicators are listed in the tables below; they have been selected both for their relevance and in the belief that the effort to report against them will not be too onerous.

Table 5 contains objectives and indicators common to all FES programs, regardless of the program's ultimate goal or which OFDA sector/sub-sector it falls within. At a minimum, OFDA recommends that you measure and report on the performance-based objectives and indicators in this table. Your ability to accomplish objectives within your sector/sub-sector hinges on meeting this underlying set of objectives.

TABLE 5: FES PERFORMANCE-BASED INDICATORS

OBJECTIVE	INDICATOR(S)	DATA COLLECTION TOOL(S)	COMMENTS
Increased fuel savings	Average fuel use per capita (kg/person) % change in average fuel consumption per household (over the life of the program)	Kitchen Performance Test (KPT)	The open fire (or most commonly used stove in the camp/settlement pre-intervention, if it is used on a large scale) will be the baseline against which to compare the FES. See Step 11 for minimum sample size and details on how to conduct the KPT
Improved access to fuel-efficient stoves	# of distributed stoves used for at least 50% of cooking needs (over the life of the program)	A log/recording tool to track distribution; ongoing monitoring and/or observation checklist and/or survey	
Enhanced beneficiary satisfaction	% of respondents reporting they prefer the new FES stove to their traditional stove/open fire	Post-intervention household survey	See Step 11 for guidance on sample size

Even if your FES activity is part of a larger program in the Health, Protection, or Economic Recovery and Market Systems sectors, it will be useful to track and report on FES-specific activities as they relate to the chosen sub-sector(s). The objectives and indicators in Table 6 below can help you link your FES activities to your overall program objectives. If you are proposing a stand-alone FES activity under the listed sectors and the required indicators contained in the *Guidelines* are not appropriate, you may recommend customized indicators, such as those shown in this table, for your FES activity (these indicators must be approved by OFDA personnel before the program commences).

TABLE 6: OFDA SECTOR-RELATED FES OBJECTIVES

OBJECTIVE	INDICATOR(S)	DATA COLLECTION TOOL(S)	COMMENTS
Enhance income-generation opportunities	Number of individuals employed through FES activities (disaggregated by sex; reported quarterly) Amount in US$ generated per participant through FES activity over the life of the program (disaggregated by sex)	Program documents/logs tracking participant employment status Survey/program documents tracking amount of money generated through employment or sale of FES or FES-related activity (e.g., meals, stove parts, etc.)	
Reduce risk of gender-based violence	Average number and % change in number of trips needed to collect firewood per week per household	The initial household survey can be used as the baseline; a post-intervention survey, in conjunction with pre-and post-intervention interviews, can be used to determine the program impact	
Reduce the risks of burns and house fires	Percent change in the number of house fires in households that replaced traditional stoves/open fires with FES (over the life of the program) Percent change in the number of burns in households that replaced traditional stoves/open fires with FES (over the life of the program)	Household questionnaire, and key informant interviews Use of camp/settlement reports on fire incidents, where available	Baseline will be based upon beneficiary recall and camp/settlement reports (when available)
Reduce exposure to air particulates/air pollution	Average percent change in particulate emissions (PM2.5) from cooking through use of FES per household (over the life of the program)	Pre- and post-intervention testing in the field according to commonly used protocols (see Resource Guide for indoor air pollution resources)	Testing must be done by a qualified organization with specialized equipment and approved by OFDA

The objectives and indicators in Tables 5 and 6 seek to demonstrate the overall impact of your FES activity. The objectives and indicators in Table 7 enable you to monitor and track various elements of your program throughout implementation to help you determine if the program is on track to meet your overall goals. OFDA recommends that you record progress against these objectives/indicators for your own decision-making purposes; the results may also be reported to OFDA. This list is illustrative and you may wish to track additional indicators as well.

TABLE 7: KEEPING TRACK OF OVERALL PROGRAM GOALS

OBJECTIVE	INDICATOR(S)	DATA COLLECTION TOOL(S)	COMMENTS
Improve capacity to produce FES	# and % of stoves produced that meet quality standards set by the implementing organization (over the life of the program)	Production logs	
	# of people trained in stove production (disaggregated by sex; reported quarterly)	Program records	
Increase knowledge of safe/efficient cooking practices	# of people trained on efficient stove use/behaviors (reported quarterly)	Program training and monitoring records	
	# and % of people trained who can state two ways to reduce fuel consumption	Post-intervention survey	
Increase ability to maintain and repair FES	# of people trained to repair/maintain stoves (reported quarterly)	Program records	
	Average # of repairs made per household per stove over the life of the program	Ongoing household monitoring logs, interviews, focus groups	

STOVE TESTING PROTOCOLS AND USER SATISFACTION ASSESSMENTS

It is important to conduct rigorous quantitative stove performance testing in addition to qualitative assessments of stove performance and desirability in order to accurately gauge the impact of your program. In some cases, beneficiary perceptions of fuel consumption and other factors may differ from actual performance. Quantitative testing alone, however, does not offer sufficient information on how readily stoves might be adopted by beneficiaries. Therefore, stove testing and user satisfaction assessments need to be conducted periodically throughout FES program implementation. Doing so will enhance the likelihood that your program will meet its targets. Step 11 includes several tools that should be used for stove testing and determining user satisfaction. These tools include:

1. Focus group protocols and sample questions: Focus groups should be held periodically to assess user satisfaction with their new stoves and to obtain feedback on stove performance and program implementation. Focus groups should be held frequently during the pilot phase of the project, and perhaps once a month during the implementation period of the project. The focus group participants and topics may be selected as needed by the program; i.e., for the first few months, it is recommended that focus groups be held with cooks who have received new stoves in the previous month. Focus groups may also be held six months after cooks receive their stoves to ascertain how the stoves are performing (for example, to gauge durability and user satisfaction), or to gauge beneficiary attitudes on how effective the program's training efforts have been. Focus groups can be an extremely useful way of gathering information from beneficiaries and using it to tailor your program. The focus group protocol provided in Step 11 Tool A is specifically designed to be used in conjunction with the CCTs conducted during the pilot phase of the project.

2. Protocol for the controlled cooking test (CCT): CCTs should be conducted during the pilot phase to help you determine whether the stove you intend to promote might realistically achieve fuel savings and will be acceptable to beneficiaries. The simplified CCT protocol provided in Step 9 Tool A includes detailed instructions for conducting the CCT and data sheets that can be used to record test results.

Following the protocol instructions is an observation form that can be used by monitoring staff with the CCT to capture qualitative aspects of the test, such as how comfortable the cooks seem using the FES and how easy the stoves are to light. In cases where a new stove model is being considered for production as part of the FES program, OFDA recommends that your FES expert first conduct a series of water boiling tests (WBT) to verify that the stove records greater thermal efficiency and lower fuel consumption than the three-stone fire. If the findings of the WBT are promising, you should then proceed to CCTs. The WBT protocol and data sheets may be found at www.pciaonline.org/testing.

3. **Protocol for the kitchen performance test (KPT)**: The KPT is the principal quantitative tool for determining the impact of your FES intervention on household fuel consumption. It will help you measure household fuel consumption before and after beneficiary households obtain their new stove. The sample size of the KPT need not be particularly large, but data must be collected numerous times, at specified times, from each household. The instructions in the KPT tool will walk you through the process and provide you a data logging sheet with which to record your findings.

4. **Post-intervention survey**: A post-intervention survey should be conducted to assess key aspects of your FES program, particularly end-user satisfaction with their new stoves. The data gathered from this survey, together with the data obtained from the KPT, will be your primary tools for measuring program impact. The post-intervention survey should be conducted toward the end of the project implementation period, preferably with a randomly selected population. (See Step 11 Tool D for guidance on Random Sampling Methodology).

EXTERNAL EVALUATION

Given the amount of preparation required to successfully launch an FES program and the typical period of OFDA funding (12 months), using the above methods to track and monitor your progress will be acceptable for your first year of implementation. If you wish to apply for follow-on funding to continue your FES program, however, you should consider having an external evaluation conducted to provide an independent assessment of your program. The evaluation should review the process and impact areas of the program to identify and re-orient activities for the duration of the program. If you obtain funding for multiple years, you should plan to have an external evaluation conducted at the end of your program, which will focus on impacts and results.

An external evaluation should be conducted by an organization or individual who has not been part of the program and can offer an unbiased view of the results. In general, the specific content and methodology of evaluations will differ greatly according to the type of program being implemented, and what the results will be used for. External evaluations typically address one or more of the following five key areas: effectiveness; efficiency; impact; sustainability; and relevance.

At a minimum, the following questions typically would be included in an external evaluation:

- What have been the major achievements/impacts of the program to date?
- Has the FES program met its stated objectives? If not, why not?
- Has the FES program reached its stated indicator targets? If not, why not?
- Are there differences in the way the FES program activities are being carried out among groups of participants/households? If so, why? What are the impacts of this differentiation?
- Has the FES program been cost-effective? If not, what are the reasons?
- Who is benefiting from the FES program and how are they benefiting?
- Have program beneficiaries been satisfied with the FES and are they using the stoves?
- Is the FES program sustainable without additional funding from OFDA?
- What are some important lessons learned from the program, both positive and negative?

For additional information on evaluation within the context of USAID foreign assistance programs, you should consult the *USAID Evaluation Guidelines for Foreign Assistance and Evaluation Standards* for more details about types of evaluations and questions to be addressed in evaluation. These documents are available at: https://communities.usaidallnet.gov/fa/node/1433

Another source of information on evaluation in international contexts is the Evaluation Network of the OECD Development Assistance Committee. The main website is designed to improve information exchange and knowledge sharing: www.oecd.org/dac/evaluationnetwork. The DAC Evaluation Resource Centre (DEReC) gives access to evaluation reports published by the Network and its members, available at www.oecd.org/dac/evaluationnetwork/derec.


fes

STEP 11

TOOLS & RESOURCES

> Step 11 Tool A: Focus Group Discussion Protocol
> Step 11 Tool B: Kitchen Performance Test Protocol
> Step 11 Tool C: Post-Intervention Survey
> Step 11 Tool D: Guidance on Random Sampling Methodology

TOOL A: **Focus Group Discussion Protocol**

This tool provides guidance on conducting focus groups with your beneficiaries (or potential beneficiaries) in order to obtain information you can use to tailor your implementation strategy. Most of the questions in the sample protocol provided in this tool are designed to be used in conjunction with the Controlled Cooking Test; additional questions based on OFDA sectors are also provided. The protocol may be adapted to obtain information on other subjects, such as the effectiveness of end-user training, fuel gathering and preparation, etc. A focus group can be used as a stand-alone tool, as a supplement to the Household Survey (Step 3 Tool B) or Controlled Cooking Test (Step 9 Tool A), or to inform the development of a new survey.

Focus groups can be extremely useful, efficient ways to obtain information on attitudes and behaviors otherwise not captured with quantitative data, and can help determine whether survey data are valid and reliable. One advantage of this tool is that a wide variety of individuals, including those who are illiterate or have limited literacy skills, can participate in the flexible and informal conversational discussions. Questions are designed to be open-ended in order to encourage respondents to offer information that is often not captured in a forced-choice survey design. However, in order to prevent sessions from taking too long (and becoming onerous to both program staff and participants), focus groups typically must allow for a limited number of questions and themes that can be covered during a session. In order to prevent diversions and distractions, the facilitator should select a setting for the focus group that will enable participants to focus freely on and discuss the subject matter. Since lack of anonymity and confidentiality may limit participants' willingness to speak openly, it is important that facilitator(s) have excellent group process skills to ensure maximum effectiveness of focus group interviews. In no circumstance should a beneficiary be forced to participate in a focus group, or be obligated to speak during a group discussion if he or she is uncomfortable.

This protocol provides an overview of typical questions that can be asked during a focus group activity. The pre-prepared questions are very general and provide a guideline for discussions rather than a prescriptive checklist. Many questions may be answered directly as a result of the respondents' conversations with the interviewer, but in other instances, probing questions will be needed to follow up on new topics of discussion or to elicit more detail on a given subject. Careful notes should be taken by both the interviewer and the translator. The interview could be audio- and/or videotaped if appropriate, with the permission of respondents. Note, however, that the use of these technologies may significantly affect people's willingness to share information or opinions openly.

KEY ROLES OF FOCUS GROUP PARTICIPANTS

Participants

Six is a minimum, but acceptable, number of participants for an effective focus group discussion; the total number of participants should not exceed 12. Monitoring staff should consider including translators and others on a case-by-case basis if their participation will facilitate the discussion without impeding the users' willingness and ability to share their thoughts. Participation should be voluntary and non-compensated (although drinks such as tea and snacks may be served to participants during the discussion).

Facilitator

The focus group should be facilitated by an individual who speaks the local language, and has a comfortable relationship with the program participants. Ideally s/he should have previous significant experience with conducting group discussions, and an understanding of their principles (i.e., open-ended but focused) and his/her role (i.e., facilitative, not advisory). Most importantly, s/he should be skilled at listening, and watching the group for participants' reactions to various questions and comments.

FES program staff will identify the facilitator for the focus group discussion. Often someone from outside the community is a better choice, so that any prevailing hierarchies or relationships will not impinge on the participants' freedom to speak honestly and openly. If no such individual can be identified, the monitoring staff member can facilitate the

discussion him/herself. According to prevailing cultural sensitivities, a facilitator of the same gender as the cooks may be preferable. Ensure that the gender of the facilitator will not hinder participation (in some cultures, women do not feel comfortable speaking in front of men).

Translator

If needed, the facilitator can engage the services of a translator who has a strong command of the language of the participants. The facilitator must ensure that the translator has previous translation experience. At a minimum, the translator must have a clear understanding of his/her role, and be sufficiently aware of the need to provide direct translations without additions or deletions, avoid answering on behalf of participants, and avoid asking leading questions where they are not in the focus group protocol. The facilitator should ask the participants ahead of time if they prefer a male or female translator.

Monitoring staff

A member of the FES program monitoring staff may choose to be present at a session with a facilitator and can interject with questions, clarifications, or thought-provoking questions. The program staff should be responsible for taking notes during the focus group discussion. It is suggested that the staff member take some time with the translator and facilitator at the end of the discussion to ensure that all key points have been captured.

Again, to reduce the burden of note-taking during discussions, the discussions could be recorded. Permission to record the conversations should be given beforehand by participants and facilitator, with a clear explanation of why recording is being requested.

Monitoring staff should not be present during focus groups that are conducted during an external evaluation in order to encourage full openness and participation of participants.

PRACTICALITIES

Explanation and introduction

Explain the purpose of the discussion, the roles individuals and facilitators have, and emphasize that there are no right or wrong answers and that there will be no personal consequences (positive or negative) for participating or not participating in the focus group. Describe the types of questions you will be asking and how the information you will be collecting will be used. Always obtain permission to quote interviewees and/or to take pictures. Establish a time limit for the discussions: one hour is probably reasonable. A second focus group time can be scheduled if issues arise that participants would like to continue discussing. Sample language on how to explain the purpose of your focus group discussion and obtain participant permission to proceed may be viewed at www.fuelnetwork.org.

Stoves

Preferably one model of each type of stove used in the program should be available during the discussion, to enable the facilitator to confirm that participants are referring to the same stove and can make specific comments about its performance and desirability. It may also be useful to have photos/diagrams of various stoves to aid discussion.

Location

You should choose a site for the focus group discussions that is quiet and undisturbed, so that the participants are not interrupted or distracted.

SELECTED DISCUSSION TOPICS AND ACTIVITIES

The first two categories (and associated activities) are appropriate for use in conjunction with CCTs, especially during the pilot phase. Category three may apply to all FES programs once implementation has begun; categories four and five relate to specific OFDA sectors and may be used either for program design purposes or to gauge program impact.

I. Comparing the FES with the Old Stove

- Do you like any particular features of the new stove? What are they and why do you like them? (e.g., if time-saving was particularly valued, why is this important?)
- Do you dislike any features of the new stove? Which ones and why?
- What would you change about the stove if you could?
- (if the participants do not already own the stove) Would you like to own this stove? Why/why not? How much would you be willing to pay for this stove? (if participants already own the stove, skip to next question)
- Is cooking with your new stove different from cooking with your traditional stove? If so, how is it different?
- Are there any similarities between cooking with your new stove and cooking with your traditional stove? If so, what was similar?

Activity 1: Ranking the FES

Invite participants to rank the new stove(s) (individually and then as a group) according to a number of criteria, including for example:

- overall performance
- desirability
- attractiveness
- convenience/ease of use
- fuel efficiency
- safety (from burns and house fires)

If these criteria elicit a variety of opinions, subsequent questions can focus on why opinions differed. Both the individual and group answers are valuable.

> Probing deeper: Once the stove is ranked, the facilitator can then question participants about choices, for example "What is convenient about this stove?" "Is there a way to make this stove more desirable to you?"

Activity 2: Ranking FES attributes

Using a set of clearly drawn/labelled cards to represent a ranking system (numerical or other that is appropriate for literacy level of participants) participants will be asked to rank the given stove, traditional or new, according to the following attributes:

- uses less wood
- attractive appearance
- speed of cooking
- ease of cooking
- safety (fewer burns and/or house fires)
- less smoke
- others, as appropriate

Participants will be invited to discuss their choices and decisions, and particular note should be made of any pertinent disagreements among participants

II. Cooking Techniques

- What/how did you cook before displacement?
- Would you consider cooking with your neighbors in order to use less firewood and therefore not have to collect it as often? Why or why not?
- What is the most important part of cooking for you? (apart from making food edible, of course) – the social aspect (cooking with other family members, for example), having a fire to gather around, the act of providing for your family, etc.
- For what other purposes do you use firewood/fuel?

III. FES Training

- Did you receive any training regarding how to use your new stove?
- (if yes) What are your opinions of the training you received? Was it useful? Can you remember what you were taught? (try to solicit information on subject matter)
- Is there anything you think should be changed about the training you received?
  (if no) Would you like to receive training regarding your new stove? On what topics?

IV. Fuel and Gender-based Violence Concerns

- What issues do you have concerning the fuel you use to cook with?
- (If concerns about safety are mentioned, you can ask the following)
  - Is there something that you fear inside the camp/outside the camp?
  - What/who makes you feel unsafe?
  - Is this a recent concern, or has that been there for a long time?
  - Are there times when you feel it is safer to leave the camp? Why?
  - Are there circumstances/locations where you feel safer? Why?
  - What would make you feel safer?
  - What do you normally do to protect yourself?
  - (if applicable) Did you ever participate in a firewood patrol? What did you feel about them? Would you participate again if they were available?
  - (If they are using new stoves) Has the use of a new stove had any impact on your fuel collection activities?

V. Income-Generation Activities

- Are you using your stove for income-generation activities? What information would you like to share about these activities?
- How do you like to use the money you earn? What sorts of things do you buy with this money?

TOOL B: **Kitchen Performance Test Protocol**

Adapted by Aprovecho Research Center [and modified by USAID] from the Kitchen Performance Test developed for the Household Energy and Health Program, Shell Foundation

The full KPT protocol can be found at: http://pciaonline.org/testing or http://www.aprovecho.org/lab/pubs/testing.

The Kitchen Performance Test (KPT) is the principal field-based procedure used to demonstrate the effect of stove interventions on household fuel consumption. The primary goal of the KPT is to quantify the impact of improved stove(s) on fuel consumption in real households. To meet this aim, the KPT measures fuel consumption in households before and after receiving the FES. This type of testing, when conducted carefully, is the best way to understand the stove's impact on fuel use. However, implementing the test can be difficult because it requires multiple household visits which some beneficiaries may find intrusive, and because potential sources of error are harder to control in comparison to laboratory-based tests. It is essential that the KPT be done under the direction and guidance of your stove expert to obtain the most reliable results.

The KPT can be used for many different kinds of assessments:

1. To demonstrate differences in consumption of cooking fuels between households using traditional cooking technologies and households using improved stove technologies
2. To assess medium- or long-term patterns of fuel consumption that result from stove interventions for example, testers can periodically survey a sample of households using the new stove(s) in order to determine if changes in patterns of fuel consumption are sustained in the long term

3. To test for seasonal variations in fuel consumption resulting from changes in climate, fuel availability, or local agro-economic cycles (independent of technological change)

4. To test for differences in fuel consumption among households using similar stoves but different types of fuel (e.g., firewood compared to crop residues)

5. To test for changes in fuel consumption resulting from changes not directly related to stove technology (e.g., energy market or power sector reforms, income-generating projects, public education campaigns, etc.)

This protocol focuses on the first type of assessment—testing for the difference in fuel consumption between households using the traditional type of stove and households using the improved stove(s). However, stove promoters are encouraged to use variations of the protocol to test other aspects of their projects in order to fully understand how the project can impact the target communities.

Balance for weighing firewood	A large-capacity scale will be most appropriate
Pots and other cooking utensils	These should be supplied by each household, and need not be standardized
Fuel	Adequate supply of fuel to conduct all cooking tasks for the duration of the KPT
Wood moisture meter	To measure the moisture content of the fuel used in each household

The following equipment is necessary to conduct the KPT. Step 12 Tool A contains contact information for suppliers of some of the specialized equipment.

OFDA recommends that wood not be provided specially to families participating in the KPT, as this might encourage them to use more firewood than usual. However, if fuel is

not provided, you must make arrangements with the family to keep accurate records of fuel coming into the household each day to ensure that it is not used without first being weighed.

In order to compare a family's fuel use with a traditional stove to the FES you are promoting, you should conduct daily measurements in the homes of families using the traditional stove for a chosen period of time (e.g., 3–7 days), followed by daily measurements of the same families using the improved stove for the same period of time. This approach is called a paired-sample study with no control.

The choice of families potentially can affect the outcome of the tests. The best way to avoid bias is to choose families randomly from a list that includes all of the participating families. This ensures that all families have equal probability of being selected for the survey. If the project involves the dissemination of a large number of stoves or is targeting many different communities, then random selection for the KPT is strongly recommended. This is the only way that the data collected from the KPT can be extrapolated to the entire beneficiary population in a statistically valid manner. Guidance on selecting a random sample may be found in Step 11 Tool D. If random sampling is not possible, OFDA grantees should be sure to note the methodology used to select the sample when reporting the illustrative results.

Through the KPT, you will measure daily fuel consumption in order to calculate the average per capita quantity of fuel consumed in the household. The full KPT protocol will help you convert the quantity of fuel consumed during the tests to total energy consumption, but this calculation is not required by OFDA.

Procedure for Fuel Consumption Measurements

The post-intervention survey (see Step 11 Tool C) should be conducted in conjunction with the KPT (but the KPT responses should be kept separate from the post-intervention sample). The procedure that follows is for the fuel consumption measurement itself. It assumes that you have already conducted the household survey (Step 3 Tool B) and

identified a pool of potential families from question #34 on that survey. The KPT Household Data and Calculation form may be found on the flash drive that accompanies this Toolkit, or can be downloaded from www.pciaonline.org.

STEP 1 The pool of people identified from the household survey will form your sample frame (refer to Step11 Tool D). From this frame you should randomly select 20 households to participate in the KPT. If random sampling is not possible, choose households as your specific circumstances allow.

STEP 2 Define the testing period (at least three consecutive days). Try to avoid weekends unless testing is to extend over an entire week. Also avoid holidays and be aware of local events like market days and celebrations that may involve above-average fuel consumption. Be aware that three days of testing involves four days in contact with the family—the first day is spent briefing families, as discussed in the next section.

STEP 3 Explain to family members the purpose of the test, and arrange to measure their fuel consumption at roughly the same time each day. Stress to household members that their cooking practices should remain as close to normal as possible for the duration of the test.

STEP 4 Ask the family to define an inventory area to store the fuel during the test. If the family is going to collect or purchase solid fuel during the days of the test, ask them to keep newly collected or purchased solid fuel separate from fuel that has already been weighed and tested for moisture. If necessary, provide containers to help the family keep newly gathered fuel separate from fuel that is already measured. Make sure the wood is kept dry.

STEP 5 Visit each household at roughly the same time each day, without being intrusive. With each daily visit, record the types/number of meals cooked and the number of people that ate their meals in the household since your last visit. Record the gender and

age of each person (this information is used to calculate the number of standard adult persons served—see table below. (You will need to modify the KPT data sheets or create another data log to accompany it to record the types/number of meals cooked). Record the fuel consumption by weighing the remaining wood.

GENDER AND AGE	FRACTION OF STANDARD ADULT
Child: 0-14 years	0.5
Female: over 14 years	0.8
Male: 15-59 years	1.0
Male: over 59 years	0.8

STEP 6 Record the weight and moisture content of any newly collected fuel before it is added to the family's stock. A wood moisture meter measures fuel moisture on a dry basis by measuring the conductivity between two sharp probes that are inserted in the wood. The probes should be inserted parallel with the grain of the wood. The device may be adjusted for different species and calibrated for different ambient temperatures. Wood moisture can vary in a given piece of wood as well as among different pieces from a given bundle. When the meter is used, take three pieces of wood randomly from the bundle and measure each piece in three places. This yields nine measurements overall. The moisture of the bundle should be reported as the average of these nine measurements. The data spreadsheet will convert this average to a wet basis and account for its influence on fuel consumption.

STEP 7 Compile the results at the end of the test period (at least three days of measurements). Use the KPT Household Data and Calculation form to calculate the total and per capita daily consumption of all fuels.

STEP 8 Inform participating families of the results, and thank them for their cooperation.

TOOL C: **Post-Intervention Survey**

The post-intervention survey should be conducted toward the end of your program period in order to obtain information on program impact for your final report (and to inform a proposal for continuation of the program, if you wish to consider that option). It is important that the post-intervention survey be conducted using a random sample in order to minimize bias and inaccuracy, and to maximize the likelihood that the information you gather adequately represents your whole beneficiary population (see Step 11 Tool D for guidance on selecting a random sample).

TAILORING THE POST-INTERVENTION SURVEY TO YOUR SITE

As with the household survey, the development of the post-intervention survey will be an iterative process. You should modify the survey provided in this Toolkit to reflect the particular conditions of the site where you have implemented your FES program. Once you have modified the survey questionnaire, it will need to be translated into each language that is spoken at your site. It is recommended that the translation be conducted by a translator who knows both English and the local language(s), and who is familiar with local cooking practices and cookstove terminology. Once the translation is complete, a second person should translate it back into the original language. This process addresses possible errors due to poor translation or uncertainty about the meaning of a particular question. This is the best way to ensure an accurate translation.

The final translated survey needs to be pre-tested with a small number of respondents before the survey is rolled out. According to the results of this pre-test, you may need to make appropriate adjustments. It is also important to field-test the data collection instrument, to ensure that your staff can use it comfortably in a field environment. A sample data collection spreadsheet (using coding techniques similar to those described

in Step 3 Tool B, the household survey) is included on the flash drive. (Note that this spreadsheet will need to be modified to match the final version of your survey instrument.) Adjusting the survey and developing the final survey and data collection instruments will take approximately two to three weeks. The number of survey questions in this Toolkit has been limited to those that are most crucial to the assessment of an FES program in order to minimize the time required to complete the survey. The survey will take an estimated 20-30 minutes to implement per household. However, it may take more or less time at your particular site, depending on the willingness of households to participate, cultural norms, security requirements, and travel time between households.

POST-INTERVENTION SURVEY TEMPLATE, BY OBJECTIVE

You should ask stove users specific questions that will enable you to report on the individual, objective-specific FES indicators you indentified for your program (see Step 2 Tool A). The survey questions below are organized by program objective; not all will be relevant to your program and you should tailor the survey accordingly. At a minimum, you should obtain answers to the FES-specific questions in sections A, B, and C, (see Step 11 Table 5). Depending upon your program objective, you may add additional questions (or implement other means of gathering data) to track the indicators relevant to your program.

A. INCREASED FUEL SAVINGS

1) Have you saved fuel using your new stove? ❑ YES ❑ NO
   a. If yes, how do you know you have saved fuel? *(Check all responses given)*
      - ❑ I keep track of fuel I use (1)
      - ❑ I am collecting fuel less often (2)
      - ❑ I spend less money on fuel (3)
      - ❑ Other (4) _____
   b. If yes, how much less fuel do you use with your new stove?
      - ❑ 1-50% less fuel compared to my old stove (1)
      - ❑ Between 51 and 100% of the amount I needed for my old stove (2)

c. If no, do you use the same amount of fuel for your new stove as for your old stove, or do you use more fuel?
   - ❑ Same amount of fuel (1)
   - ❑ More fuel (2)

d. If you use more fuel for your new stove, why? *(Check all responses given)*
   - ❑ New stove is less efficient (1)
   - ❑ I don't know how to use my new stove well (2)
   - ❑ I cook more with my new stove (3)
   - ❑ Don't know (4)
   - ❑ Other (5) _____

2) **If you save fuel with your new stove, do you save money every week by not having to buy as much fuel?** ❑ YES ❑ NO

a. If yes, how much money do you save per week? (in local currency and USD) *(Check ONE response only)*
   - ❑ Up to US$3 (1)
     Local currency equivalent _____
   - ❑ US$3 to US$5 (2)
     Local currency equivalent _____
   - ❑ US$5 to US$10 (3)
     Local currency equivalent _____
   - ❑ More than US$10 (4)
     Local currency equivalent _____

b. If no, why aren't you saving money as a result of needing less fuel? *(Check all responses given)*
   - ❑ Fuel has gone up in price (1)
   - ❑ I need to buy more fuel for other reasons (2)
   - ❑ I collect my fuel (do not purchase) (3)
   - ❑ Other (4) _____

3) **If you saved fuel, did you change the number of times you go to collect fuel each week?** ❑ YES ❑ NO

a. How many times per week did you collect fuel for your old stove? *(Check ONE response only)*

- ❑ 0-3 (1)
- ❑ 4-6 (2)
- ❑ More than 6 (3)

b. How many times per week do you collect fuel for your new stove? *(Check ONE response only)*

- ❑ 0-3 (1)
- ❑ 4-6 (2)
- ❑ More than 6 (3)

4) **If your new stove saves fuel, are you able to reduce the amount of time you need to buy/collect fuel?** ❑ YES ❑ NO

a. If yes, how much time do you save in one week? *(Check ONE response only)*

- ❑ Less than 1 hour (1)
- ❑ One-half day (2)
- ❑ Around one full day (3)
- ❑ More than one day (4)

b. What do you do with the time you save? *(Check all responses given)*

- ❑ Rest/leisure (1)
- ❑ Income-generation activities (2)
- ❑ Spend time with family (3)
- ❑ Other (4) _____

c. If no, why aren't you saving time when buying/collecting fuel? *(Check all responses given)*

- ❑ It takes the same amount of time no matter the amount (1)
- ❑ I sell wood that I collect (2)
- ❑ Other (3)_____

5) **Do you still cook with your old stove?** ❑ YES ❑ NO

a. If yes, what do you cook with your old stove? *(Check all responses given)*

- ❑ Main meals (1)
- ❑ Coffee/tea (2)
- ❑ Other (3) _____

b. How many times per week do you cook with your old stove? *(Check ONE response only)*

- ❑ 1-3 (1)
- ❑ 4-5 (2)
- ❑ More than 5 (3)

6) **Which stove do you use more, your new stove or your old stove?** *(Check ONE response only)*

- ❑ New stove (1)
- ❑ Old stove (2)

7) **Why do you use this stove more?** *(Ask respondent to choose the ONE most important characteristic)*

- ❑ Cooks better tasting food (1)
- ❑ Uses less fuel (2)
- ❑ Is more attractive (3)
- ❑ Other (4) _____

B. IMPROVED STOVE ACCESS

8) How did you obtain your new stove? *(Check ONE response only)*

- ❑ Free from the project (1)
- ❑ Bought through the project (2)
- ❑ Given to me by a friend/family member (3)
- ❑ Bought it at the market (4)
- ❑ Other (5) _____

9) How many months have you had your new stove? *(Check ONE response only)*

- ❑ 0-3 (1)
- ❑ 3-6 (2)
- ❑ 6-12 (3)
- ❑ More than 12 (4)

10) Would you have been able to obtain a new stove without this program?

❑ YES ❑ NO

If yes, where/how?

- ❑ Free from friend/family member (1)
- ❑ Bought at market/store (2)
- ❑ Bought from friend/family member (3)
- ❑ Build it myself (4)
- ❑ Other (5) _____

11) Did you pay any money for your stove? ❑ YES ❑ NO

a. If yes, how much? *(Check ONE response only)*

- ❑ Less than US$1-2 (1)
- ❑ US$2-5 (2)
- ❑ US$5-10 (3)
- ❑ More than US$10 (4)

(*specify amount*) _____

b. If yes, is this a reasonable amount for your budget? ❑ YES ❑ NO

C. ENHANCED BENEFICIARY SATISFACTION

12) Are you satisfied with your improved stove? ❑ YES ❑ NO

a. If yes, why? *(Check all responses given)*

- ❑ Cooks food well (1)
- ❑ Easy to use (2)
- ❑ Produces less smoke (3)
- ❑ Uses less fuel (4)
- ❑ Is attractive (5)
- ❑ Other (6)_____

b. If no, why not? *(Check all responses given)*

- ❑ Does not cook food well (1)
- ❑ Difficult to use (2)
- ❑ Produces more smoke (3)
- ❑ Uses as much or more fuel (4)
- ❑ Is not attractive (5)
- ❑ Other (6) _____

D. ENHANCED INCOME-GENERATION OPPORTUNITIES

13) Did you use your old stove to make money? ❑ YES ❑ NO

If yes, how? *(Check all responses given)*

- ❑ Sell drinks or food (1)
- ❑ Other (2) _____

14) Do you use your new stove to make money? ❑ YES ❑ NO

If yes, how? *(Check all responses given)*

- ❑ Sell drinks or food (1)
- ❑ Other (2) _____

15) How much income do you earn per week with your new stove?

- ❑ US$1-5 (1)
- ❑ US$5-10 (2)
- ❑ More than US$10 (3)
- ❑ Other (4) _____

16) How did you choose your income-generating activity?

- ❑ My idea (1)
- ❑ Idea from project staff (2)
- ❑ Idea from friend/family member (3)

17) Did you receive advice from the program about how to design and manage your income-generating activity? ❑ YES ❑ NO

If yes, was it useful? ❑ YES ❑ NO

E. REDUCED RISK OF GENDER-BASED VIOLENCE

18) When you go out to collect fuel, is there anything that makes you or your family members feel unsafe? ❑ YES ❑ NO

If yes, what makes you feel unsafe?

- ❑ Attacks or harassment by people (1)
- ❑ Attacks by animals (2)
- ❑ Weather conditions (3)
- ❑ Other (4) _____

19) If you save fuel with your new stove, does that mean you or your family members go out less often to collect fuel? ❑ YES ❑ NO

If no, why not?

- ❑ I need to collect fuel for other reasons (1)
- ❑ I sell the fuel that I collect (2)
- ❑ Other (3) _____

F. REDUCED RISKS OF HOUSE FIRES AND BURNS

20) Has your new stove ever tipped or fallen over? ❑ YES ❑ NO

If yes, how many times since you received it?

- ❑ One time (1)
- ❑ Many times (2)

21) Have you or any of your children been burned by the new stove?

❑ YES ❑ NO

If yes, did the person who was burned require medical help? ❑ YES ❑ NO

22) Are you able to use your new stove safely? ❑ YES ❑ NO

If no, why not?

- ❑ Stove is not safe (1)
- ❑ I didn't receive adequate training (2)
- ❑ Other (3) _____

G. REDUCED EXPOSURE TO AIR PARTICULATES/AIR POLLUTION

(Grantees reporting on reduced exposure to air pollution will need to conduct additional surveys with households where indoor air pollution monitoring is conducted.)

23) How much smoke does your new stove produce compared to your old stove? *(Check ONE response only)*

a. More smoke (1)
b. Less smoke (2)
c. Same amount of smoke (3)

24) If there is less smoke, is that a good thing or a bad thing? ❑ GOOD ❑ BAD

a. If it is a good thing, why?
   - ❑ Better for my/my family health (1)
   - ❑ Keeps cooking area clean (2)
   - ❑ Don't know (3)
   - ❑ Other (4) _____

b. If it is a bad thing, why?
   - ❑ More insects (smoke keeps insects away) (1)
   - ❑ Don't know (2)
   - ❑ Other (3) _____

H. IMPROVED CAPACITY TO PRODUCE FES (IF BENEFICIARIES PRODUCED THEIR OWN STOVES)

25) What was the quality of the training you received on stove production?
❑ Good ❑ Bad ❑ Neutral ❑ No opinion

a. If it was good, why was it good? *(Check all responses given)*
   - ❑ Easy to understand (1)
   - ❑ Trainers were good (2)
   - ❑ Useful information (3)
   - ❑ Other (4) _____

b. If it was not good, why not? *(Check all responses given)*
   - ❑ Not easy to understand (1)
   - ❑ Poor trainers (2)
   - ❑ Information not useful (3)
   - ❑ Other (4) _____

26) Can you build an efficient stove? ❑ YES ❑ NO

27) Can you teach someone else how to build an efficient stove? ❑ YES ❑ NO

I. INCREASED KNOWLEDGE OF SAFE/EFFICIENT COOKING PRACTICES

28) Did you receive training on how to cook with your new stove? ❑ YES ❑ NO

a. If yes, what was the quality of the training you received on safe/efficient cooking practices? ❑ Good ❑ Bad ❑ Neutral ❑ No opinion

b. If the quality was good, why?

- ❑ Easy to understand (1)
- ❑ Trainers were good (2)
- ❑ Useful information (3)
- ❑ Other (4) _____

c. If the quality was bad, why?

- ❑ Not easy to understand (1)
- ❑ Poor trainers (2)
- ❑ Information not useful (3)
- ❑ Other (4) _____

29) Are you able to use your stove properly? ❑ YES ❑ NO

30) Can you teach someone how to use the stove properly? ❑ YES ❑ NO

31) Were there any training techniques that were useful to you? ❑ YES ❑ NO

a. If yes, which one was the most helpful?

- ❑ Demonstrations (1)
- ❑ Posters and training materials (2)
- ❑ Hands-on practice (3)
- ❑ Other (4) _____

J. INCREASED ABILITY TO MAINTAIN AND REPAIR FES

32) Did you receive training on how to maintain and repair your new stove?
❑ YES ❑ NO

33) Do you know how to maintain and repair your new stove? ❑ YES ❑ NO
a. If no, why not
❑ Did not receive training (1)
❑ Received training, but it was poor or inadequate (2)
❑ Other (3) _____

34) Have you made repairs to your new stove? ❑ YES ❑ NO
a. If yes, how many?
❑ One (1)
❑ Many (2)
b. What kind of repairs did you make? (describe)_____

35) Do you have access to materials needed to repair your stove? ❑ YES ❑ NO
a. If no, why not
❑ No materials available in/near the site (1)
❑ Materials are available, but too expensive (2)
❑ Other (3) _____

36) Could you teach someone how to maintain/repair his/her stove?
❑ YES ❑ NO

TOOL D: **Guidance on Random Sampling Methodology**

This step provides guidance on selecting a random sample from a targeted population. OFDA recommends that you use a random sample for both the household and post-intervention surveys (but particularly the post-intervention survey, which you will use to report program impact). If security or other constraints make it impossible to follow the random sampling guidance below, you may use the purposeful sampling techniques detailed in Step 3 Tool B. When you report the results of your surveys, be sure to indicate which sampling methodology you employed.

A RANDOM SAMPLE

If you are not able to interview every individual household in your target population (i.e., conduct a census), you will need to sample your population to determine which households will participate in your survey. For survey instruments that are designed to collect quantitative data (information that is counted, quantified, or assigned a number), you should use a representative sample of the entire population which should be selected according to random sampling techniques. (Qualitative data—in the form of rich, descriptive detail that you do not want to quantify—are collected using focus group techniques, to give one example. Guidance on gathering information through focus groups can be found in Step 11 Tool A).

In order for a sample to be truly random, it must meet certain criteria: (1) each household must have an equal, non-zero chance of being selected; and (2) it must be possible to calculate mathematically the chance of selection.

SAMPLE SIZE

Sample size calculations are a function of probability statistics, and follow set formulas. A free, easy-to-use sample-size calculator is available at Raosoft: http://www.ezsurvey.com/samplesize.html. Or you can use the table provided below. The suggested number (sample size) of households to select randomly out of your entire beneficiary or target population (your sampling frame) provided in the table below will provide you with results you can be confident in for a simple or systematic random sample.

Table 1

NUMBER OF HOUSEHOLDS IN SAMPLING FRAME	SAMPLE SIZE FOR SYSTEMATIC OR SIMPLE RANDOM SAMPLE
50 households or fewer	Interview all
100 households	Select 70 out of 100
200	Select 105 out of 200
300	Select 125 out of 300
400	Select 140 out of 400
500	Select 150 out of 500
900	Select 170 out of 900
From 1,000 to 1,500 households	Select 180 out of your total
From 1,600 to 5,000 households	Select 195 out of your total
6,000 households or more	Select 205 out of your total

Sampling Frames of 50 households or less

If your total beneficiary population is 50 households or fewer, it is best to interview all the households (a census). It is far easier to interview everyone than to try to determine a truly random sample. It will also eliminate potential jealousies between households not interviewed and those interviewed.

Simple random sample

A simple random sample (where you simply "draw numbers out of a hat" without interval calculations to choose individual households) and a systematic random sample are equivalent in their sample size requirements. Systematically choosing a sample, however, described below, is actually easier than pulling names out of a hat.

Systematic Random Sample for groupings above 50 households

STEP 1 List all the households (in all camps/settlements) in your targeted population in a spreadsheet (Excel, for example):

Table 2

EXCEL ROW #	NAME OR UNIQUE IDENTIFIER FOR HOUSEHOLD	CAMP OR SETTLEMENT NAME OR ID CODE
1	Household A-22-NW	Camp 1/NW
2	Household A-23-NW	Camp 1/NW
3	Household B-4-SE	Camp 3/SE
4	Household B-5-SE	Camp 3/SE
etc.	Household ……	

STEP 2 Divide your sample size (use 205 as an example, for a beneficiary population of 6,000 or more households, as per Table 1) by the total number of households in your target beneficiary list (i.e., for your post-intervention survey, all the households who will receive or have received the intervention). For example, say your list comes to 4,164 households. 4,164 divided by 205 = 20.312. For this example, then, this number (20.312) is your sampling interval. (Note that using figures out to three decimal places is standard procedure.)

STEP 3 Now randomly select a number from 1 to 20 (the distance of your sampling interval) as your starting point. You can do this in Excel. You may need to install and load the Analysis ToolPak add-in from the Tools menu (in the Add-Ins available list, select the Analysis ToolPak box, and click OK):

Tools

Add-Ins

☑ Analysis ToolPak

OK

With the cursor in a cell, type in the syntax =RANDBETWEEN(bottom,top). For this example, we want to find a random number between 1 and 20, so 1 is our bottom integer and 20 is our top integer; =RANDBETWEEN(1,20). A number will be randomly generated. For more help, go to the help function of Excel and type in "RANDBETWEEN." Most scientific calculators also have a random number generator capability.

Say you randomly selected the number 6. The household on your list that is in your excel spreadsheet row numbered 6 will be your starting point. Mark this household as 1 (you will be randomly selecting 1 through 205, since your sample size = 205 in this example).

STEP 4 You will use the excel spreadsheet list of households to calculate and select the rest of the 205 households you will sample, as described in the example below. Since your sampling interval is 20.312, the next selection is the household listed in the spreadsheet row number 26, since it is closest to the sum of 6 (your starting point) and your sampling interval; 6 + 20.312 = 26.312. Continue using this sampling interval (always use the actual value—do not round up or down) to find the rest of your 205 selections. 26.312 + 20.312 = 46.624, so the household listed in row 47 is your third selection. For your next selection, add the sampling interval again: 46.624 + 20.312 = 66.936. Your fourth selection is the household in row 67. Add the sampling interval again: 60.936 + 20.3125 = 87.248. Your fifth selection is the household in row 87. And so forth, until you have selected 205 households. If you are careful to begin at a randomly selected starting point that is not greater than your sampling interval, and if you continue to add the actual value of your sampling interval as calculated, you should find that your systematic random selection is evenly spread across all the households in your list (i.e., across your sampling frame).

EXCEL ROW	NAME OR UNIQUE IDENTIFIER FOR HOUSEHOLD	CAMP OR SETTLEMENT NAME OR ID CODE			20.312 = *sampling interval*	
1						
	Etc…					
6	Household 9-S-22	Camp/settlement 2	1	6	6+20.312=	26.312
7						
	Etc…					
26	Household 112-f-49	Camp/settlement 2	2	26.312	26.312 + 20.312=	46.624
27						
	Etc…					
47	Household 43-SS-22	Camp/settlement 2	3	46.624	46.624 + 20.312=	66.936
48						
	Etc…					
67	Household 42-d-22	Camp/settlement 3	4	66.936	66.936 + 20.312=	87.248
68						
	Etc…					
87	Household 1299-F-2	Camp/settlement 3	5	87.248	87.248 + 20.135=	107.56
	Etc…					*Etc…*

If you did not use an existing map (designed in collaboration with camp or settlement leaders or other community members), you may need to create a map for easy location of each household in your selected list so that enumerators can locate the households.

Stratified Samples

If there are particular ethnic groups in a camp or settlement whose cooking practices differ substantially from other ethnic or ethno-linguistic groups in your target population, you will need to stratify your sample. Divide your excel spreadsheet list of households into separate worksheets for the households of each ethnic group. If a particular group (a stratum) numbers 50 households or less, it is best to interview all the households in that group. For groups (strata) of more than 50 households, determine the sample size required and randomly select the appropriate number to sample within each stratum or

group according to the same methodology above. If ethnic groups are likely to have similar cooking practices group them together in one sampling frame instead of separately.

Substitutions

Once you have determined randomly how many households you will survey, you need to attempt to interview a cook in each household from that list. If you cannot interview someone in a selected household (e.g., they are not home after one or two visits, or if they refuse to answer your questions), make a note that they either refused to answer or they could not be reached, and continue on with your list. Your sample size already includes a 5% margin for non-response. It is very important to stick to your randomly selected list of households; do not substitute a different household, do not sample more than your selected households, and do not stop before sampling your selected household. Any of these actions will negate your ability to calculate the probability of selection, which results in data that is no longer representative, so you've spent time and money on data that are no longer representative.

Two-Stage Cluster Sample

If your total number of beneficiaries exceeds 6,000 households, you do not have, or cannot generate, a complete list of households, or if the clusters of households (villages, settlements, camps) are too far apart to drive from one to another in order to reach a randomly selected household, you should use a two-stage cluster sampling technique. A valuable source of information on two-stage sampling is available at: http://nccphp.sph.unc.edu/PHRST5/TwoStageSampling.pdf.

STEP 1 Identify clusters across the settlements of your identified targeted beneficiaries. (NOTE: If you will be comparing beneficiaries to a control or comparison group, you will need to do a parallel sample across matched clusters of non-beneficiaries.) Clusters can be neighborhoods, blocks, villages, or other units. If you can identify fairly easily recognizable boundaries, such as roads, footpaths, or rivers, for example, these can serve to define clusters within a larger community or settlement. If feasible, try to map out clusters of approximately equal size, of about 30-50 households each. If you have more than 200 villages in your targeted area and you can locate rough estimates of the

population of each village, you can use the villages as your clusters. If you have fewer than 100 villages in your targeted area, it is better to divide each village into clusters of approximately equal size across all villages.

STEP 2 Once you have determined the clusters, create a unique identifier for each cluster and create a list of all the clusters and the approximate number of households per cluster, as in the example below. You will also need to create a second column with the cumulative population (i.e., the running sum of estimated number of households per each cluster), as illustrated in the table below.

ROW	NAME OR UNIQUE IDENTIFIER FOR CLUSTER	VILLAGE NAME	APPROX # HOUSEHOLDS	CUMULATIVE POPULATION*
1	Cluster A1	village a	50	50
2	Cluster A2	village a	60	110
3	Cluster A3	village a	30	140
Etc.	---	---	---	-----
424	Cluster P7	village p	63	16,329

STEP 3 If your sample size is close to 900, consider doing a 30x30 2-stage cluster (30 clusters with 30 households per cluster). In this step, you will randomly select 30 clusters, with the probability of selection proportional to population size. Divide your first-stage sample size (30) into the total estimated number of households in your target beneficiary list (i.e., all the households who will receive or have received the intervention). For example, if your list totals 16,329 households, 16,329 divided by 30 = 544.3. In this example, this number (544.3) is your sampling interval (SI).

STEP 4 Now randomly select a number from 1 to 544 (the distance of your sampling interval) as your starting point. Say you randomly selected the number 138. The cluster in your list that contains this number (refer to the cumulative population) will be your starting point. Mark this cluster number 1 (you will be randomly selecting 30 clusters at this stage).

STEP 5 You can use the excel spreadsheet list of clusters to calculate the rest of the 30 clusters you will sample at the first stage, as in the example below. Note that once the sampling interval is calculated for each sampling stage, it remains the same for that particular sampling stage (544.3 in this example). Add the sampling interval (always use the actual value—do not round up or down) to the cumulative population at your starting point, which in the first instance is 138; 138 + 544.3 = 682.3. The cluster that contains 682.3 is your second selected cluster. For your next selection, add the sampling interval again: 1226.6 + 544.3 = 1770.9. Your third selection is the cluster listed in row 32. Add the sampling interval again: 1770.9 + 544.3 = 2892.6. Your fourth selection is the cluster listed in row 46. And so forth, until you have selected 30 clusters in this first stage. You should find that your systematic random selection of clusters in this first stage is evenly spread across all the clusters in your list and that the clusters have a probability of selection proportional to their population size (this is most important if your cluster sizes vary widely).

ROW	IDENTIFIER FOR CLUSTER	VILLAGE NAME	# HHS	CUM POP	to 30	Contains	(sampling interval = 544.3)	
1	Cluster A1	village a	50	50				
2	Cluster A2	village a	60	110				
3	Cluster A3	village a	30	140	1	138	138 + 544.3 =	682.3
4	Cluster A4	village a	32	172				
	Etc…							
18	Cluster C3	village c	50	706	2	682.3	682.3 + 544.3 =	1226.6
19	Cluster C4	village c	60	766				
	Etc…							
32	Cluster F2	village f	32	1235	3	1226.6	1226.6 + 544.3 =	1770.9
33	Cluster F3	village f	31	1266				
	Etc…							
46	Cluster G9	village g	47	1804	4	2348.3	2177.2 + 544.3 =	2892.6

STEP 6 In the SECOND stage, you need to select households to interview per cluster. You can do this in two ways: (1) randomly select 30 households out of each cluster per the random sampling methodology described above; or (2) if the cluster sizes are approximately 30 households, you can attempt to interview every single household within the cluster. (This is another reason to consider identifying clusters of approximately equal size, and approximately 30 households each.)

Option 1. You might want to draw a rough map of the cluster with the assistance of local community leaders who understand the importance of random selection of households (if you want a representative sample, do not select households because of convenience or because a community leader points you to specific households). Once you have drawn a map, you can assign a number to each household on the map and randomly select 30 (you can draw numbers out of a hat or utilize the Systematic Random Sample technique described above). Remember: do not substitute a different household, and do not sample more than your selected 30 clusters because this will negate your ability to calculate the probability of selection and your sample is no longer truly random, and thus no longer statistically representative of the population.

Option 2. Interviewing all households within a cluster—a "take-all" approach—might prove easier and more desirable if your cluster sizes range from 30-50 households in size. This way, you do not run the risk of creating jealousy between neighbors who were not selected for the survey, and your team of enumerators does not have to determine a method to sample the households in the cluster, since they are aiming to interview every household in the cluster. The key in both these options is to identify clusters that are fairly easily defined.

PUTTING IT ALL TOGETHER:

TOP 10 TIPS FOR SUCCESSFUL FES PROGRAMS

At this point, you should understand the concepts and issues central to effective FES program design and implementation. Although the long list of steps that OFDA recommends you to undertake may seem daunting, the tools we've provided throughout this Toolkit will go a long way toward helping you collect and analyze the various types of data you will need both to implement your program and to report your results. Step 12 Tool A, the Resource Guide, provides a comprehensive list of additional resources that may be useful.

To sum things up, here is our list of Top 10 Tips for implementing a successful FES program.

TOP 10 TIPS FOR SUCCESSFUL FES PROGRAMS

1. Set aside time and budget for extensive upfront planning and training
2. Listen to your beneficiaries—their views and perceptions are critical
3. Standardize stove production
4. Seek hard data—test your stoves
5. Train, train, train—both staff and beneficiaries
6. Use your creativity to encourage stove adoption
7. Keep asking questions—you only learn what you ask about or look for
8. Remember your objectives, but be adaptable—there will always be problems to overcome
9. Track your progress—keep good records
10. Report your results


fes

STEP 12

TOOLS & RESOURCES

- Step 12 Tool A: Resource Guide
  - Technology
  - Monitoring and Evaluation
  - Indoor Air Pollution (IAP)
  - Humanitarian Contexts
  - Other Sources of Information
  - Labs and Consultants
  - Equipment

TECHNOLOGY

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
Aprovecho Research Center, Shell Foundation and Partnership for Clean Indoor Air	Design Principles for Wood-Burning Cook Stoves	Publication	http://www.bioenergylists.org/stovesdoc/Pcia/Design%20Principles%20for%20Wood%20Burning%20Cookstoves.pdf	Tech 1	6/1/2005
Baldwin, Samuel F., and Volunteers in Technical Assistance (VITA)	Biomass Stoves: Engineering Design, Development, and Dissemination	Publication	http://bioenergylists.org/node/407	Tech 2	1987
German Technical Cooperation (GTZ)	Institutional Stove Brochure	Brochure		Tech 3	11/1/2003
HEDON Household Energy Network	Knowledge-based articles on household stoves	Resource List	http://www.hedon.info/Category:HouseholdStoves	Tech 4	
Partnership for Clean Indoor Air	Design and Performance Guidance for Improved Cooking Technology	Publication	http://www.pciaonline.org/files/Design_and_Performance_Guidance.pdf	Tech 5	
Practical Action	How to Build, Use and Maintain a Better Kiln	Publication	http://practicalaction.org/practicalanswers/product_info.php?products_id=230	Tech 6	1996

TECHNOLOGY *(CONTINUED)*

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
Practical Action Sudan	Clay-Based Technologies	Publication	http://practicalaction.org/docs/region_sudan/clay-based-technologies.pdf	Tech 7	8/1/2007
O'Neal, Don, HELPS International and Partnership for Clean Indoor Air	Guide to Designing Retained Heat Cookers	Publication	http://www.pciaonline.org/files/RHC%20Guide%20English.pdf	Tech 8	7/1/2007
Owen, Matthew, and United Nations High Commission for Refugees	Cooking Options in Refugee Situations: A Handbook of Experiences in Energy Conservation and Alternative Fuels	Publication	http://www.unhcr.org/406c368f2.html	Tech 9	12/1/2002
Still, Dean, and Aprovecho Research Center	What is an Improved Stove?	Publication	http://www.bioenergylists.org/files/What%20Is%20an%20Improved%20Stove_DS.pdf	Tech 10	
Winiarski, Larry, and Aprovecho Research Center	Ten Stove Design Principles for Wood – Burning Stoves	Poster	http://www.aprovecho.org/lab/index.php?option=com_rubberdoc&view=doc&id=19&format=raw	Tech 11	

MONITORING AND EVALUATION

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
Habermehl, Helga, and GTZ	Economic Evaluation of the Improved Household Cooking Stove Dissemination Programme in Uganda	Report	http://www.gtz.de/de/dokumente/en-cost-benefit-analysis-uganda-2007.pdf	M&E 1	5/1/2007
ProAct Network	Assessing the Effectiveness of Fuel-efficient Stove Programming	Assessment Report	http://www.fuelnetwork.org/index.php?option=com_docman&task=doc_download&gid=238%20·	M&E 2	9/1/2008
Programme for Biomass Energy Conservation (ProBEC)	Stove Producers Assess Their Impact	Assessment Report	http://www.gtz.de/de/dokumente/en-questionnaire-assessment-2005.pdf	M&E 3	2005
United Nations High Commission for Refugees	The UNHCR Tool for Participatory Assessment in Operations	Publication	http://www.wpro.who.int/internet/files/eha/toolkit/web/Technical%20References/Human%20Rights/UNHCR%20Tool%20for%20participatory%20assessment%20in%20operations.pdf	M&E 4	5/1/2006

MONITORING AND EVALUATION *(CONTINUED)*

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
AED for United States Agency for International Development	Fuel-efficient Stove Programs in IDP Settings: Summary Evaluation Report, Darfur, Sudan	Assessment Report	http://pdf.usaid.gov/pdf_docs/PDACM099.pdf	M&E 5	12/1/2008
Berkeley Air Monitoring Group for United States Agency for International Development	Evaluation of Manufactured Wood-burning Stoves in Dadaab Refugee Camps, Kenya	Assessment Report	http://www.berkeleyair.com/images/stories/publications/wood stove evaluation in dadaab_final.pdf	M&E 6	2/1/2010
AED for United States Agency for International Development	Fuel-efficient Stove Programs in IDP Settings: Summary Evaluation Report, Uganda	Assessment Report	http://pdf.usaid.gov/pdf_docs/PDACM098.PDF	M&E 7	9/1/2007
World Health Organization	Evaluating Household Energy and Health Interventions: A Catalogue of Methods	Publication	http://www.who.int/indoorair/publications/methods/full_catalogue_method.pdf	M&E 8	2008

INDOOR AIR POLLUTION

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
Center for Entrepreneurship in International Health and Development (CEIHD)	Indoor Air Pollution Monitoring In Ghana	Progress Report to The Shell Foundation	http://ceihd.org/images/stories/publications/Ghana%20final.pdf	IAP 1	4/1/2006
Center for Entrepreneurship in International Health and Development (CEIHD) and The Gaia Association	Indoor Air Pollution Monitoring Summary: The Gaia Association CleanCook Stove Tests in the Kebribeyah Refugee Camp	Assessment Report	http://ceihd.org/images/stories/publications/IAP%20Kebribeyah.pdf	IAP 2	3/1/2007
Environmental Health at USAID	Web resource with program updates and reports, fact sheets, references and research papers relating to indoor air pollution and environmental health	Indoor Air and Energy Program Information	http://www.ehproject.org/eh/eh_topics.html	IAP 3	
Hutton, Guy, Eva Rehfuess, Fabrizio Tediosi, and Svenja Weiss for the World Health Organization Programme for Indoor Air Pollution	Evaluation of the Costs and Benefits of Household Energy and Health Interventions at Global and Regional Levels	Publication	http://www.who.int/indoorair/publications/household_energy_health_intervention.pdf	IAP 4	2006
Hutton, Guy, and Eva Rehfuess for the World Health Organization Programme for Indoor Air Pollution	Guidelines for Conducting Cost-benefit Analysis of Household Energy and Health Interventions	Publication	http://www.who.int/indoorair/publications/guideline_household_energy_health_intervention.pdf	IAP 5	2006

INDOOR AIR POLLUTION *(CONTINUED)*

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
Practical Action	Smoke, Health and Household Energy Volume 1: Participatory methods for smoke alleviation technologies Volume 2: Researching pathways to scaling up sustainable and effective kitchen smoke alleviation	Publication	http://practicalaction.org/smoke/docs/smoke/Smoke_Health_and_Household_Energy.pdf and http://practicalaction.org/smoke/docs/smoke/smoke_health_household_energy_2.pdf	IAP 6	2006
Practical Action	Weighing Up the Cost of Smoke Alleviation	Article	http://practicalaction.org/smoke_report_4	IAP 7	
Smith, Kirk R., and University of California-Berkeley Environmental Health Sciences Program	Health research laboratory focusing on indoor air pollution	Monitoring Resource	http://ehs.sph.berkeley.edu/	IAP 8	
Smith, Kirk R., and University of California-Berkeley Environmental Health Sciences Program	Randomized Exposure Study of Pollution Indoors and Respiratory Effects (RESPIRE)	Randomized Intervention Study	http://ehs.sph.berkeley.edu/guat/page.asp?id=02	IAP 9	
StoveTec Emissions Solutions	Developer and vendor of low-cost indoor air pollution meters	Testing Equipment Resource	http://stovetec.net/emissions/	IAP 10	
Winrock International for United States Agency for International Development	Peru Healthy Kitchen/Healthy/ Stove Pilot Project	Report	http://pdf.usaid.gov/pdf_docs/PDACN009.pdf	IAP 11	12/1/2008

INDOOR AIR POLLUTION *(CONTINUED)*

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
Winrock International for United States Agency for International Development	Commercialization of Improved Cookstoves for Reduced Indoor Air Pollution in Urban Slums of Bangladesh	Report	http://pdf.usaid.gov/pdf_docs/PNADO851.pdf	IAP 12	5/1/2009
Winrock International	Household Energy, Indoor Air Pollution and Health Country Overviews (Guatemala, India, South Africa, China, Nepal, and Philippines)	Publication	http://www.pciaonline.org/node/301	IAP 13	2004
World Health Organization	Evaluating Household Energy and Health Interventions: A Catalogue of Methods	Publication	http://www.who.int/indoorair/publications/methods/full_catalogue_method.pdf	IAP 14	2008

HUMANITARIAN ISSUES

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
Inter-Agency Standing Committee (IASC) SAFE task force	Decision Tree Diagrams on Factors Affecting Choice of Fuel Strategy in Humanitarian Settings	Decision Tool	http://www.unhcr.org/cgi-bin/texis/vtx/refworld/rwmain/opendocpdf.pdf?reldoc=y&docid=4ac5f3fd2	Human 1	4/1/2009
Inter-Agency Standing Committee (IASC) SAFE task force	Matrix on Agency Roles and Responsibilites for Ensuring a Coordinated, Multi-Sectoral Fuel Strategy in Humanitarian Settings	Decision Tool	http://www.unhcr.org/refworld/publisher,IASC,,,4ac5f1b22,0.html	Human 2	4/1/2009
van Dorp, Mark, Institute for Environmental Security and IUCN-Netherlands Committee	Dealing With Energy Needs in Humanitarian Crisis Response Operations	Publication	http://www.envirosecurity.org/fuel/Quick_Scan_FUEL_project.pdf	Human 3	9/1/2009
Women's Commission for Refugee Women and Children	Beyond Firewood: Fuel Alternatives and Protection Strategies for Displaced Women and Girls	Publication	http://womensrefugeecommission.org/reports/doc_download/165-beyond-firewood-fuel-alternatives-and-protection-strategies-for-displaced-women-and-girls	Human 4	3/1/2006
Women's Commission for Refugee Women and Children	Finding Trees in the Desert: Firewood Collection and Alternatives in Darfur	Publication	http://www.preventgbvafrica.org/system/files/finding_trees_in_the_desert.pdf	Human 5	3/1/2006
Women's Refugee Commission	Women's Refugee Commission Fuel and Firewood Alternative Initiative	Web Resource	http://womensrefugeecommission.org/programs/firewood	Human 6	

OTHER SOURCES OF INFORMATION

AUTHOR/ ORGANIZATION	TITLE	RESOURCE TYPE	WEB LINK	FLASH DRIVE ID	PUBLICATION DATE
ENERGIA	ENERGIA: International Network on Gender and Sustainable Energy	Web resource	http://www.energia.org/	Gen 1	
Energy Sector Management Assistance Program (ESMAP)	ESMAP contributes to the transfer of technology and knowledge in energy sector management and the delivery of modern energy services to the poor.	Energy policy and technical assistance resource	http://www.esmap.org/index.asp	Gen 2	
Engineers Without Borders (USA and International Chapters)	Sustainable engineering solutions to developing communities.	Technology and partnering resource	www.ewb-usa.org AND http://www.ewb-international.org/index.htm	Gen 3	
ETHOS	Engineers in Technical and Humanitarian Opportunities of Service	Technology and partnering resource	http://www.vrac.iastate.edu/ethos/	Gen 4	
HEDON	HEDON Household Energy Network	Web resource	http://www.hedon.info/index.htm	Gen 5	
United Nations Development Programme	Gender & Energy: A Toolkit for Sustainable Development and Resource Guide	Toolkit	http://www.undp.org/energy/genenergykit/	Gen 6	2004
United States Agency for International Development	Fuel-efficient Stove Programs in IDP Settings: A Desk Study	Report		Gen 7	2/1/2007
USAID Office of Foreign Distaster Assistance (OFDA)	OFDA Guidance on Fuel-efficient Stove (FES) Activities	Guidance Document	http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/publications/FES_1-09.pdf	Gen 8	1/1/2009
Women's Commission for Refugee Women and Children	FES - Workshop Report	Report	http://www.womensrefugeecommission.org/docs/firewood_darfur_workshop.pdf	Gen 9	2/1/2008

LABS AND CONSULTANTS

There are several labs and academic groups that either design/develop their own stove models, or are independent monitoring and testing entities. These labs can provide guidance on appropriate technology selection as well as support to your M&E team in monitoring and verifying the impact of your activities.

The list below is by no means exhaustive, nor does inclusion on the list imply endorsement by USAID. The Partnership for Clean Indoor Air is another excellent resource on organizations and testing labs and can be found at: http://www.pciaonline.org/partners/search

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Organization:	Appropriate Rural Technology Institute
Address:	2nd Floor Maninee Apartments, Survey No.13, Dhayarigaon, Pune, Maharashtra, 411 041 India
Email:	contact@arti-india.org
Phone:	91-20-24390348
Website:	http://www.arti-india.org/

Appropriate Rural Technology Institute (ARTI) is an NGO based in Maharashtra, founded by a group of scientists and social workers in 1996. The mission of the organization is to serve as an instrument of sustainable rural development through the application of scientific and technological knowledge.

Organization	Aprovecho Research Center
Address	79093 Highway 99, Cottage Grove, Oregon 97424 USA
Contact	Dean Still, Executive Director
Email	dean@aprovecho.org
Contact	Sandra Moen, Business Manager
Email	sandra@aprovecho.org
Phone	541-767-0287
Website	http://www.aprovecho.org/lab/home

Aprovecho Research Center (ARC), established in 1976, is dedicated to researching, developing and disseminating appropriate technological solutions for meeting the basic human needs of refugees and impoverished people and communities in the developing world. ARC provides technical assistance and related appropriate technology to projects around the world. The main focus is on cooking and heating systems that use biomass for fuel.

Organization	Atmospheric Research and Information Analysis Laboratory (ARIAL), Centre for Energy Research and Development (CERD)
Contact	Dr. Imoh Obioh
Email	iobioh@yahoo.com
Phone	234(0)8053105146
Website	http://www.oauife.edu.ng

The mission of atmospheric research at ARIAL is to create a multidisciplinary research environment to develop and apply techniques of basic and applied sciences to ensure that enhanced understanding of atmospheric science provides support for human health protection, as well as environmental and economic sustainability. Hence ARIAL's focus

has been on systematic observations and modeling of indoor and outdoor air quality, climate change, and basic atmospheric and anthropogenic processes, including emissions management which are associated with atmospheric change, and their impacts.

Organization	Berkeley Air Monitoring Group
Address	2124 Kittredge Street #57, Berkeley, CA 94704
Contact	Dana Charron
Email	dcharron@berkeleyair.com
Phone	510-649-9355
Website	http://www.berkeleyair.com/index.php

Founded in 2007, Berkeley Air Monitoring Group LLC fills the need for rigorous scientific evaluation of initiatives designed to improve health and well being through improved household stoves, fuels, and education. Berkeley Air's services include study design, field sampling, data analysis, report writing, presentation and training. The firm has close ties to the University of California, Berkeley, and builds directly on the household energy monitoring and evaluation methods developed by the Kirk Smith Research Group (and colleagues) and implemented by the Center for Entrepreneurship in International Health and Development (CEIHD), now known as Impact Carbon.

Organization	Bond Research Group - University of Illinois at Urbana-Champaign
Address	3230c Newmark Civil Engineering Laboratory 205 N. Mathews Ave. Urbana, IL 61801
Contact	Tami Bond
Email	yark@illinois.edu
Phone	217-244-5277
Website	http://www.hiwater.org/

This group works with people who are interested in realistic, appropriate ways of improving low-technology combustion, mostly assisting with measurement expertise. They're also interested in leveraging those connections to obtain emission data needed for regional and global models.

Organization	China Agricultural University's Renewable Resources Lab
Address	P O Box 184, East Campus, China Agricultural University, Bejing, China 100083
Contact	Dr. Renjie Dong
Phone	86 10 62737693
Website	www.cau.edu.cn

The Renewable Resources Lab of China Agricultural University (RRL) is dedicated to the development of Renewable Resources Technologies, especially technologies for bioenergy. Interests in affordable/clean/efficient cooking and heating include research on biomass furnace combustion, emission assessments, and efficiency and convenience improvements.

Organization	Colorado State University Engines and Energy Conversion Laboratory (EECL)
Address	1374 Department of Mechanical Engineering, Colorado State University, Fort Collins, CO 80523-1374, USA
Contact	Dr. Bryan Willson
Email	Bryan.Willson@Colostate.edu
Contact	Dr. Morgan DeFoort
Email	Morgan.DeFoort@Colostate.edu
Phone	970-491-4783
Website	www.engr.colostate.edu/eecl

The EECL works in many areas of energy research and development with a specific focus towards industry partnerships and commercialization of technology. Since 2008 the EECL has partnered with Envirofit International to develop and commercialize cookstoves. The EECL has developed several products for Envirofit including the S series and G series stoves. The EECL also has worked with Envirofit and Philips to develop testing methodologies for cookstoves.

Organization:	Laboratory for Energy Systems Analysis, Paul Scherrer Institute (LEA-PSI)
Address	Paul Scherrer Institut, CH-5232 Villigen PSI, Switzerland
Contact	Nic Meyer
Email	nickolas.meyer@psi.ch
Phone	41 (0) 56 310 5529
Website	http://gabe.web.psi.ch/

A multi-disciplinary lab that strives to improve understanding and enable comparisons of current energy technologies and future energy options of the electricity, heating and transport sectors based on environmental, economic and socially relevant factors. It also provides quantitative, systematic, and interdisciplinary assessments of energy technologies and energy supply strategies through the development and application of consistent and methodological frameworks and databases.

Organization	Practical Action
Address	The Schumacher Centre for Technology & Development Bourton on Dunsmore Rugby, UK CV23 9QZ
Email	practicalaction@practicalaction.org.uk
Phone	44-0-1926-634400
Website	http://practicalaction.org/energy

Practical Action's projects aim to increase poor people's access to energy technology options through improving the efficiency and productivity of biomass use, and through small-scale, low-cost, off-grid electricity supply.

Organization	Prakti Design Lab
Address	55 Francois Martin street, Kuruchikuppam, Pondicherry, India
Contact	Dr. Mouhsine Serrar
Email	mouhsine@praktidesign.com
Contact	Thomas Drouin
Email	thomas@praktidesign.com
Phone	91-944-2611-317
Website	http://www.praktidesign.com

Prakti's mission is to develop a portfolio of both locally and centrally built and maintainable products. Besides being attractive and affordable, they must be scalable. Implementers choose which specific product design/manufacturing/distribution fit best their geographic area, their resources, their timeframe.

Organization	The Energy and Resources Institute (TERI) Biomass Energy Technology Applications Area
Address	Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi - 110 003, INDIA
Contact	Mr. Sunil Dhingra

Email	dhingras@teri.res.in
Contact	Mr. Amit Kumar
Email	akumar@teri.res.in
Phone	91 11 2468 2100
Website	http://www.teriin.org/index.php?option=com_division&task=view_area&id=12

The objective of TERI is to develop and disseminate technologies for efficient utilization of biomass, agriculture residues, and industrial wastes as fuels. The group is committed to taking the technologies developed in the laboratory to the field.

Organization	The Sustainable Energy Technology and Research (SeTAR) Centre at the University of Johannesburg
Address	University of Johannesburg, PO Box 524, Auckland Park, South Africa
Contact	James Robinson
Email	jamesrobinson77@gmail.com
Phone	27-0-11-559-2911
Website	http://www.uj.ac.za/EN/Pages/home.aspx

The SeTAR Centre is a multi-disciplinary energy research facility that has capabilities in the technical areas of air emissions testing, stove design and prototype testing. SeTAR was initiated by the UJ EnerKey programme, a German-South African Research Initiative, with the aim to use energy as a key element for the sustainable development of the urban region of the Gauteng Province.

Organization	Universidad Peruana Cayetano Heredia, Laboratorio de Respiración, Instituto de Investigaciones de la Altura
Address	Av. Honorio Delgado 430, Urb. Ingeniería, San Martín de Porres, Apartado postal 4314, Lima, Peru
Contact	Dr. Roberto Accinelli Tanaka
Email	iia@upch.edu.pe
Phone	51 1 448 0964
Website	www.upch.edu.pe and http://www.upch.edu.pe/upchvi/iia/presenta.asp

This labatory performs research on indoor air pollution in diverse Peruvian communities and advocates public awareness on this enormous health problem.

Organization	University of California-Berkeley Renewable and Appropriate Energy Laboratory
Address	Richmond Field Station, BLDG 113
Contact	Daniel Kammen
Email	kammen@berkeley.edu
Phone	510-643-2243
Website	http://rael.berkeley.edu/

The Renewable and Appropriate Energy Laboratory, RAEL, is an interdisciplinary research unit of the University of California, Berkeley, with projects in a number of energy and development areas. It has long-term projects on biomass stoves, solar photovoltaics, water quality technologies, and biomass energy management.

Organization	Zamorano University
Address	Valle del Yegüare, Francisco Morazán, Honduras
Contact	Ms. Gracia María Lanza Castillo
Email	glanza@zamorano.edu
Contact	Mr. Timothy Longwell
Email	tlongwell@zamorano.edu
Phone	504-776-6140 x 2442
Website	www.zamorano.edu

Zamorano is initiating a project called "Improved Stoves Certification Center" financed by The Philanthropy Workshop (TPW) of the Rockefeller Foundation, focusing on the evaluation of seven types of stoves (Justa, Onil, Eco-fogón, Incahuasi, Malena, Patsari and Rocket). The parameters that will be evaluated are: heating efficiency, main gaseous emissions, fuel consumption, preparation time, model deterioration, cost benefit evaluation, security, acceptance of the product, and family members' health status.
To start this project, Zamorano has acquired a Portable Emissions Measurement System (PEMS) and an Indoor Air Pollution Meter (IAP) from the Aprovecho Research Center in Oregon, United States; Zamorano's vision is to become a Regional Evaluation Center for Improved Stoves in Latin America.

EQUIPMENT

There are many vendors that sell the equipment needed to carry out certain monitoring exercises detailed in this Toolkit. Below are a few companies that have extensive online catalogues and fill international orders. This list is by no means exhaustive, and a quick internet search will identify additional vendors.

PROFESSIONAL EQUIPMENT
http://www.professionalequipment.com/
1-800-334-9291
wood moisture meters, digital thermometers and scales, stopwatches, etc.

TEST EQUIPMENT DEPOT
http://www.testequipmentdepot.com/index.htm
1-800-517-8431
wood moisture meters, digital thermometers and scales, stopwatches, etc.

MOISTURE METER STORE
http://www.moisturemeterstore.com/
1-800-334-9291
wood moisture meters only

GRAINGER
http://www.grainger.com/Grainger/wwg/start.shtml
1-800-323-0620
wood moisture meters, digital thermometers and scales, stopwatches, etc.

GLOBAL TEST SUPPLY
http://www.globaltestsupply.com/
1-888-610-7664
wood moisture meters, digital thermometers and scales, stopwatches, thermometers, scales, etc.