



## Minimum Standards for Stove Test Reports for GTZ EnDEV-HERA projects

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EnDev is a Dutch-German Partnership whose objective is to provide sustainable access to modern energy services for 3.1 million people. It comprises the Netherlands Ministry for Development Cooperation (DGIS), the German Federal Ministry for Economic Co-operation and Development (BMZ) and the German Technical Co-operation (GTZ) organisation.

EnDev standards require a Controlled Cooking Test as evidence of the potential fuel savings of any specific stove type. The generally accepted test protocols are documented on the web pages of the Environmental Health Sciences Department of the University of California <http://ehs.sph.berkeley.edu/hem/page.asp?id=42>. The test protocols and corresponding data calculation sheets comprise a description of the test methods and the most important data that must be recorded.

### Documentation of test procedures and results

In practice, stove tests are not as straightforward as described in these publications. Additional information is essential to make the results comprehensive, traceable and comparable, for which the following information must be included in the documentation:

#### *Stove description*

This must be clear and have sufficient detail to characterise the stove precisely to the reader. The designation 'clay stove' or 'improved rocket stove' is not very informative for external users. Data should include:

- **Photos** and/or **drawings** of the stove, highlighting significant details such as the basic dimensions of the stove body, firebox, height, width, etc.
- Any necessary **technical descriptions** on the mode of operation
- **Specifications** of all **materials** used in manufacture, including the insulation (type, position and thickness of each material)

#### *Testing procedure*

The basic questions that need to be recorded comprise:

- **Name** of the person who carried out the test
- **Name** or **Identifier** of the person who did the cooking
- **Description** of the cook (male/female? Staff member / experienced/regular cook like a housewife?)
- **Name** of the person who took the readings and notes
- **When** and **where** the test was carried out - exact location, outdoor/indoor, laboratory or family house, height above sea level etc.
- The **test protocol** used (WBT, CCT, KPT) – including the version used
- The season of the year (which may affect fuel moisture and consumption habits)

- Weather conditions on the day of the test: Ambient temperature, wind strength (and direction relative to the stove entrance for fixed stoves), humidity

Details of the test procedure should include:

- Number many pots used
- Pot sizes
- Cooking method used (frying, boiling, baking etc.) This is especially important for multi-pot stoves, and for stoves comprising a metal plate (griddle or plancha), rather than a single pot hole.
- Whether the stove is for cooking only, or whether it has a combined cooking/heating function, and how this affects the cooking component (eg stove may regularly be kept hot between meals)
- How ingredients were prepared - before the test or during the cooking process?
- The types of food that were cooked. Quantifying the weight of each type of food cooked and its cooking time etc.
- Type of fuel used, its weight (or volume) and its moisture content (if appropriate). If moisture content cannot be measured, record this fact and describe how fuel was dried.
- Fuel (s) and method used for lighting the fire

The results of **each single test should be documented** either within the report or in an annex. To report only the average of several tests without giving the results of each individual test is insufficient.

**Documentation of interim values** is a valuable addition. A test report that documents the raw data (e.g. actual fuel consumption in kilograms, not just specific consumption) gives a more reliable overall picture of the results than a summary of the final results.

## Interpretation of the results

### *Handling extreme values*

The listing of each particular test result sometimes highlights unexpected results or *outliers*. These erratic results should be discussed and the reasons for them investigated. Only then should a decision be reached on whether to exclude them from the test or interpret their significance. Such outliers may indicate the important influence of the kitchen management, especially on stove emissions – for example, inexperienced cooks, moist fuel, short moments of inattention with open potholes, or a lack of airflow, may be among the reasons for high emissions, and should be investigated and reported.

### *Providing baseline data*

Values on their own will not give useful information to those not closely connected with a project. An **appropriate baseline** as a reference will provide a better understanding and interpretation of the results. The fuel consumption and/or typical emission levels of a traditional stove should be given as a baseline. It is important that the baseline quoted is realistic, and accurately represents the target group. To compare a leaky, crumbling, old traditional stove with a perfect, new, carefully managed 'improved' stove is not convincing to either the scientific or research communities.

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Please address questions directly to:  
Andreas Michel ([Andreas.Michel@gtz.de](mailto:Andreas.Michel@gtz.de)) or  
Christa Roth ([christa-roth@foodandfuel.info](mailto:christa-roth@foodandfuel.info))