

# BASELINE STOVE MARKET ASSESSMENT REPORT

## KEY FINDINGS AND RECOMMENDATIONS

### PHASE 2 OF THE WORLD BANK CLEAN STOVE INITIATIVE - LAO PDR

#### PILOTING IMPROVED WOODSTOVE PROJECT IN NORTHERN LAO PDR AND CONTRIBUTING TO THE DEVELOPMENT OF A COOKSTOVE STANDARDS FRAMEWORK



THE WORLD BANK

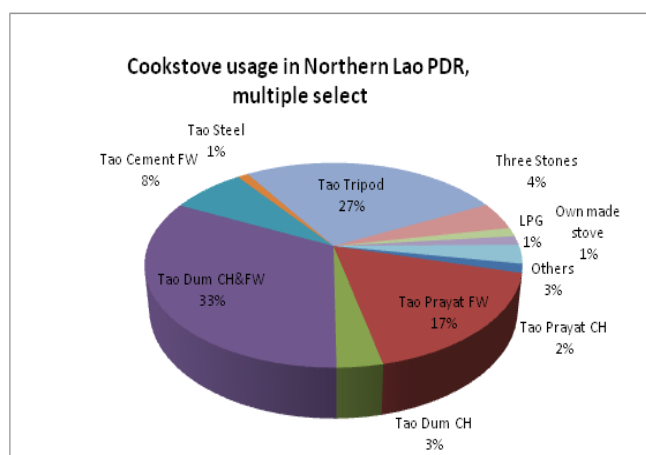
Conducted by GERES, with support from LIRE and the inter-ministerial Taskforce on Clean Cookstoves, this report establishes Lao Clean Stove Initiative (CSI) project baseline information based on the survey, study, and analysis of stove and fuel utilization, stove user characteristics and socio-economic situation (including gender and health indicators), preferences and needs in Luangprabang, Xiengkhouang and Oudomxay, the three provinces of the project in northern Lao PDR.

Included in the analysis is the performance and safety testing of selected traditional stoves according to international and adapted testing protocols, which helps assess the need and feasibility of improving existing stove models. Existing production capacities, the availability and quality of raw materials, and the labor situation in northern Lao PDR were also assessed as part of the baseline. Information and recommendations resulting from this step will inform stove research and development activities, to design a stove model that meets improved efficiency (compared to baseline), emissions, safety, indoor air pollution (IAP) and user preference requirements.

### KEY FINDINGS

- All three provinces of the project have a **strong reliance on firewood** for cooking. **98%** of surveyed rural populations use firewood as their main fuel for cooking. **More than one-third of households still use rudimentary cooking devices such as iron tripods and three stones.** These devices are very polluting and represent a significant threat to the health of household members.
- Women and young children are at a high risk of exposure to IAP from cooking with firewood. Women (primarily wives and daughters) prepare the meals in more than 90% of households.
- On average, households use **more than 9 kg** of firewood per day (*source: survey data, 2013*).
- Household members report significant time is spent collecting and preparing firewood for

cooking. On average, adults spend more than 6 hours per week on firewood collection. Young children also often participate in the task.



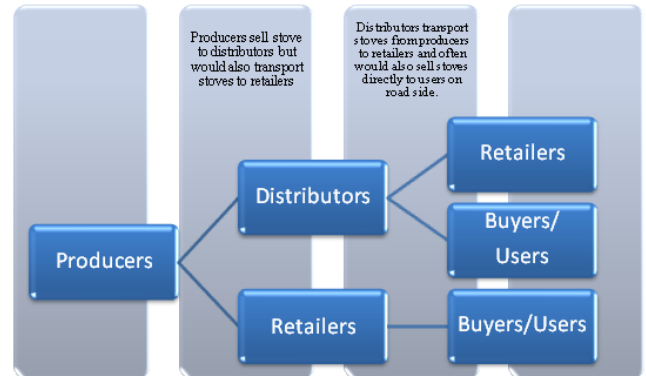
- Users generally have low awareness of the hazardous impacts of cooking smoke on health; **47%** do not think that cooking smoke is dangerous and **72%** of respondents have never heard of or received any information about the health impacts of cooking with biomass.
- Most kitchens and cooking areas (**90%**) are **poorly ventilated**.
- Many households (36%) have permanent cooking areas in the main living area. This setting allows cooking smoke to adversely affect everyone in the family, not only those that are responsible for cooking.
- Households mostly use firewood. Urban and peri-urban households were observed to mix charcoal with firewood during cooking.

**Demand for higher quality cookstoves is strong.**

- 72% of users say that they would pay from 40,000 to 50,000 LAK (5.00-6.25 USD) for a more durable stove. **Most users (91%) say they would be interested in buying fuel-saving stoves if they were available.**
- When asked what they want in an improved cookstove, most users look for a stove that is **more durable (78%)** and produces less smoke when starting (46%). **Users also aspire to change to modern cooking fuels.** Average life span of stoves owned by households ranges from only 10 months (Tao Dum Charcoal) to 27 months (Tao Steel).

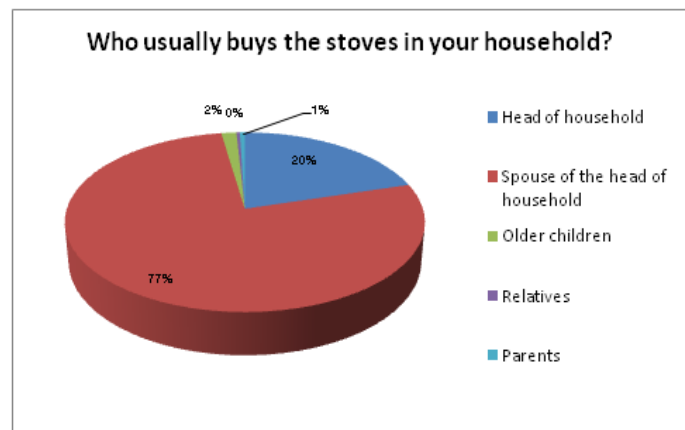
**Tao Dum is the most popular stove among users (36%), especially outside of urban centers.** Another popular stove, Tao Thai (copycat/variation of Tao Prayat), is produced both in Thailand and locally, and but is mainly distributed in urban centers.

of transporting stoves from the producers. Producers also transport stoves to retailers using trucks.



- Local stove production is limited, but continues to exist because of a strong and growing market demand (source: survey data, 2013).
- Majority of existing cookstove producers lack proper training, capital, and technical know-how to improve their production processes and product quality. However, they are eager to be trained and learn new techniques.

**It is women who usually buy stoves for households (77%)**



**DISTRIBUTION NETWORK – SUPPLY CHAIN FEATURES**

- Stove distribution is either via local distributors, who transport stoves from producers to local markets, or by ordering supply from Vientiane or Thailand. Wholesalers (distributors) bear the cost

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## Baseline Stove Performance and Emissions Testing

Three biomass cookstoves widely used in northern Lao PDR – **Tao Thai**, **Tao Dum**, and **Tao Concrete (Cement)** were selected for stove performance and emissions testing as part of the establishment of baseline information for the design of an improved cookstove.

Standard laboratory testing was conducted to determine the performance of each stove against the International Standards Organization (ISO) International Workshop Agreement (IWA) benchmark. The stoves were tested using the Water Boiling Test (WBT 4.2.2) under the Laboratory Emissions Monitoring System (LEMS) emission hood developed by Aprovecho Research Centre (ARC). The safety test was conducted following the IWA Biomass Stove Safety Test Protocol. Stove performance and emissions are rated using IWA proposed tiers<sup>1</sup>. An ISO IWA was approved by more than 90 stakeholders present at the ISO International Workshop on Cookstoves, held 28-29 February, 2012, in The Hague, Netherlands. The IWA provides a framework for rating cookstoves against a series of performance indicators.

<sup>1</sup> Tests were performed by GERES Biomass Laboratory, part of the Southeast Asia Regional Testing and Knowledge Center (RTKC) supporting activities in Cambodia, Lao PDR and Vietnam.

Test results show that Tao Dum and Tao Thai received higher ratings than Tao Concrete (according to ISO IWA method). For thermal efficiency, high power total emissions, and safety, these stoves are rated Tier 2, meaning that they offer significant improvements compared to the benchmark three-stone stove. However, on the indicator of indoor emissions of particulate matter (PM) and carbon monoxide (CO), these stoves only rate between Tier 0 and 1 (little to no difference from a three-stone stove). **Improvements in these areas would increase the overall ratings of these stoves, and help them become cleaner and efficient cooking solutions on the path towards building sustainable improved cookstove markets in Lao PDR.**

GERES's experience in improved cookstove production and dissemination shows that technical improvements and control of production quality are vital to assure measurable gains in stove performance and increased durability, resulting in higher consumer satisfaction and reduced environmental impacts.



Parameter	Tao Cement	Tao Thai	Tao Dum
High Power Thermal Efficiency	Tier 2	Tier 2	Tier 2
Low Power Specific Cons. Rate	Tier 1	Tier 1	Tier 1
High Power CO	Tier 1	Tier 2	Tier 2
Low Power CO	Tier 1	Tier 2	Tier 2
High Power PM	Tier 0	Tier 0	Tier 0
Low Power PM	Tier 1	Tier 1	Tier 0
Indoor Emission CO	Tier 1	Tier 1	Tier 1
Indoor Emission PM	Tier 0	Tier 0	Tier 0
Safety	Tier 2	Tier 2	Tier 2

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## Recommendations for Stove Prototyping, Awareness Raising, and Ensuring Sustainability

Faster cooking times resulting from cleaner and more efficient cookstoves would reduce both the health risks and environmental impacts of cooking with biomass. Considering the goal of Lao CSI **emphasis should be put on stove performance, especially regarding CO and PM emissions during the development of a local ICS design.** The information gathered during stove testing will be used primarily in research and development (R&D) activities. However, tackling the health issues associated with fuelwood consumption require changes in not only cooking equipment, but also fuel handling, kitchen setting and user behavior. Therefore, **a strong component which focuses on the social aspect of cooking, such as through awareness raising and cooking demonstrations, should be developed in parallel with cookstove performance enhancement.**

On health impact awareness raising and stove promotional campaign, information and data from the survey, particularly in the cooking practices/awareness on health impacts, housing and kitchen unit information, and socio-economic sections (i.e. education level, income/expenditures, age, and type of ventilation in cooking area) would also support the design and planning of the campaign strategy.

There have been a few improved cookstove promotional programs in Lao PDR; for instance, the introduction of Tao Prayat from Thailand. But because of the lack of cookstove standards, regulations, and quality control, the Tao Prayat over the years could not be considered an improved cookstove. The survey shows that although the Tao Prayat model is still very popular, it has a poor quality, and does not conform to the original specifications. To ensure the sustainability of the effort, the project taskforce agreed on the process to establish standards and a quality control labeling mechanism (specific standard) for improved cookstoves in Lao PDR.

**At the second project meeting in November 2013, the taskforce agreed that Lao PDR would adopt the standards and rating system of ISO:IWA 11:2012 into the Lao PDR Clean Cookstove Standard.** This adoption will be detailed in a standard document, which will serve as a Generic Guideline for the Lao Clean Cookstove Initiative.

### **Department of Standardization and Metrology (DSM), Ministry of Science and Technology: The governmental body that approves and enforces standards**

As part of the procedure to officially establish specific standards for improved cookstoves in Lao PDR, once there is a draft of the standard, a working group (Technical Committee) will review the standards according to the particular sector (e.g., wire nails for wood are reviewed by the construction committee).

Currently, there is no energy committee, but DSM will look into forming a working group on energy. Next, the standards undergo a 2-month public comment period, as per national law (through an announcement on the website of the Ministry of Trade and in local newspapers). Then, there is a high-level ministerial review. If approved, the standards will be published. This whole process can take up to 1 year, with a minimum of 7-8 months.

This note summarizes the information obtained from stakeholder consultation meetings, GERES-LIRE Baseline Stove Market Assessment in Northern Lao PDR and GERES Baseline Lao stove testing reports (2013).

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