

The Stove Testing Toolbox

A flexible and culturally appropriate approach to the scientific evaluation of domestic heating and cooking stoves

As part of the Clean Stove Initiative, a pilot has been initiated by the Government of Indonesia in partnership with the World Bank using Results Based Finance (RBF) for stove subsidies. This project requires a stove evaluation method that is flexible enough to characterise many types of stoves over a range of cooking tasks while providing precise measurements of mission-critical performance metrics.

The social science and technical teams jointly propose that cooking tasks be partitioned into characteristic modes of operation and locally relevant cooking procedures. Cooking tasks in Central Java can be characterised into at least these six groups:

- Small water heating (making tea)
- Large water heating (bathing and washing water)
- Low water cooking (cooking cabbage leaves)
- High water cooking (soup, boiling meat)
- Steaming (rice, jackfruit)
- Frying (stir-fry)

Each cooking procedure can be reported using appropriate metrics. Each metric must be described in a scientific manner based on First Principles using standard definitions and units. For example the fire-to-cooking-vessel heat transfer efficiency can be reported for 'water heating', which lends itself to measuring heat generated and heat absorbed, but not for 'frying' which does not.

Not all types of cooking can be characterised using the same metrics. It may not be possible to report all metrics for all sections of every given test. An overall metric can be reported only if all sections of the test protocol have shared metrics and units. As the 'total fuel used' and 'gaseous emissions' during the completion of both a boiling task followed by a frying task are common to both 'tools' the sum of the values and can be reported jointly for the whole cooking cycle, whereas 'heat transfer efficiency' cannot.

Because the component portions of a cooking cycle can be dissected, defined, measured and agreed separately, it is possible to assemble a toolbox of internationally accepted and independently validated test procedures without requiring any particular cooking task to be performed. This allows all locally relevant cooking behaviour to be accommodated within an international standard. Such a standard would also state how to concatenate the testing tools and how to report valid results.

Using a set of agreed and validated measurement tools which are applied intelligently to the baseline and improved stoves, a locally relevant comparative performance comparison can be made and provides the basis for making RBF payments, carbon credits and so on. The toolbox can be expanded by convening a working group of interested parties and drafting an accurate description of the cooking task type, provide the necessary definitions and metrics and have it homologated after an appropriate review process.

The Toolbox would include a User's Manual describing in words or by reference how to make measurements, calibrate equipment, record data and report results in a common framework. The emphasis on this approach is to avoid prescribing cooking tasks that are only relevant to certain locations or only certain types of stoves, or requiring metrics from a stove test that are not valid. In sum, a locally valid test comparison will inform policy makers in a reproducible and replicable manner (meaning, at other labs).

This concept was discussed with several participants at the GACC Conference in Phnom Penh on 18 March and sparked a lot of positive responses. This note is being circulated to enable others to share the idea as articulated by the WB/Indonesian CSI Pilot team.

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