

# Stove Testing Workshop



# What can we test?

**Pollution:** How much carbon monoxide is the stove producing?  
How much smoke is the stove producing?

**User convenience:** How does a user like the stove? Can he/she cook the traditional food in a convenient and safe way?

**Efficiency measurement:** How efficient is a stove? How much fuel does it need to cook?  
How much energy goes from the fuel burnt „into the pot“?

Saves 70 %  
of fuel!

Saves 60 %  
of fuel!

Saves 55 % !

Saves 40 %  
of fuel!

Saves 50 % !





**Compared to  
what??????**

# We need a baseline

We can ask the question: How did people cook before?

Baseline to test improved charcoal stoves for households:



→ traditional coalpots

Baseline to test improved institutional firewood stoves:



→ a 3-stone-fire

# Context of testing matters!

- What do I want to test?
- Who will receive the results?
- What type of test do I need to do?
- Who is going to do the test?
- Where will I do the test?

# Why do we focus on efficiency measurement?

- Because EnDev and the donors are interested in efficiency!
- There is an „EnDev – criteria“ that stoves will be supported only if they consume 40 % less fuel, compared to the baseline stove.

# Types of Tests

- **Water Boiling Test (WBT):** Test done with water in a laboratory. Focus is on the stove. Measures pollution and efficiency of a stove. Variables are well controlled. Useful to know what the stove can do.
- **Controlled Cooking Test (CCT):** A type of local food is defined and efficiency is measured. Focus is on the stove and also the user. Variables are less well controlled. Useful to know what the user can do with the stove.
- **Kitchen Performance Test (KPT):** Is done in a kitchen. Focuses on stove, user and environment. Variables are less well controlled. Useful to know what a stove can do in the household.

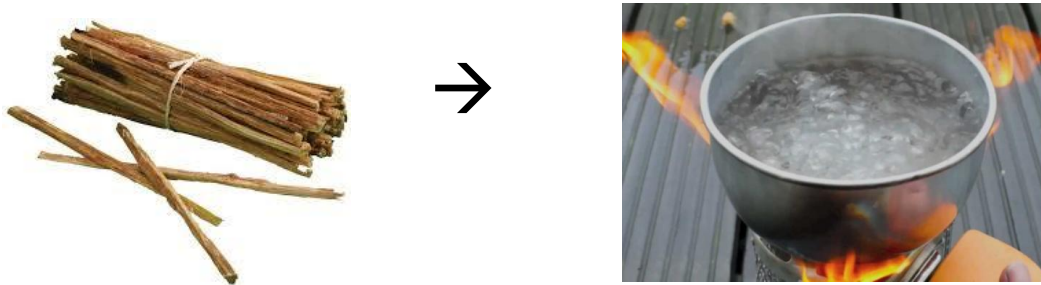


# Regional Water Boiling Test (RWBT)

- A „mix“ of the Water Boiling Test and the Controlled Cooking Test
- We do a Controlled Cooking Test with Water
- We don't do the test in a laboratory but on-site

# What exactly do we want to know?

- We want to measure the „**specific consumption**“:
- How much firewood do we use to boil 1 kg of water?



- We test the baseline and the improved stove and compare
- **Result of test:** Comparison of wood consumption in gram per kilogram of water boiled (g/kg)

# Testing Protocol

- We will make a 3-stone-fire
- We will light one of the new improved institutional stoves
- We will boil 40 l of water for 45 min (simulation cooking time) parallel
- We will measure how much firewood was consumed

# Testing Protocol

- To control the variables as much as possible/apply same conditions:
- Use the same type of firewood
- Use the same type of pot
- Use the same amount of water (40 l)
- Test the baseline 3 times
- Test the new improved stove 3 times

# Testing Protocol

- After testing the baseline (3-stone-fire) 3 times, we will have an average as a result
- Can we use this result in the future to compare other stoves?
- No! Because we have to apply the same conditions!
- This is concerning not only the same firewood, but also the same weather condition, temperature, humidity, temperature of the water...
- Every time we test a new, improved stove, we have to repeat the test for the 3-stone fire for comparison

<b>Name of stove</b>		Kuka Stove
<b>Pot</b>	Weight of pot	8000
<b>Water</b>	Weight of water	40.000
<b>Time</b>	Starting	10:20
	Boiling point	10:40
	45 min boiling	11:45
<b>Wood</b>	Starting	20.000
	End wood	1.000
	End ashes	200
<b>Pot with water</b>	Weight after test	42.000
	Total consumption	18.800
	Total water boild	34.000
<b>Result</b>	Specific consumption	553
	Time to boil	20 min

BASED ON 40LITER!!!

	% reduction av Kuko Stove	% reduction av ECHOL stove	av 3-stone fire	av Kuko	av ECHOL	3stone_01	3stone_02	3stone_03	3stone_04	Kuko_01	Kuko_02	Kuko_03	ECHOL_01	ECHOL_02	ECHOL_03
Date						28.10.2015	29.10.2015	02.11.2015	06.02.2016	28.10.2015	28.10.2015	05.02.2016	18.11.2016	08.12.2016	08.02.2017
total consumption	20	25	11152	8885	8335	14587	10106	10928	8986	9020	9269	8366	7875	8416	8715
specific consumption	23	28	290	222	208	365	295	273	225	226	232	209	197	210	218
time to boil	57	8	50	22	46	57	39	59	45	21	28	15	50	48	40