

Trans-SEC

Innovating pro-poor Strategies to safeguard Food Security using Technology and Knowledge Transfer

Participative Development of a Top-Lit-Up-Draft Reactor for Simultaneous Cooking and Biochar Making

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Introduction

The unreliable energy access, insufficient fertile soils and poor handling of agricultural wastes (e.g. maize cobs) are among the challenges in most villages of low income countries. The participative development of a strategy to counter these challenges was done by involving Hohenheim University of Germany, Sokoine University of Agriculture, and Ilakala Village of Tanzania.

Study Approach

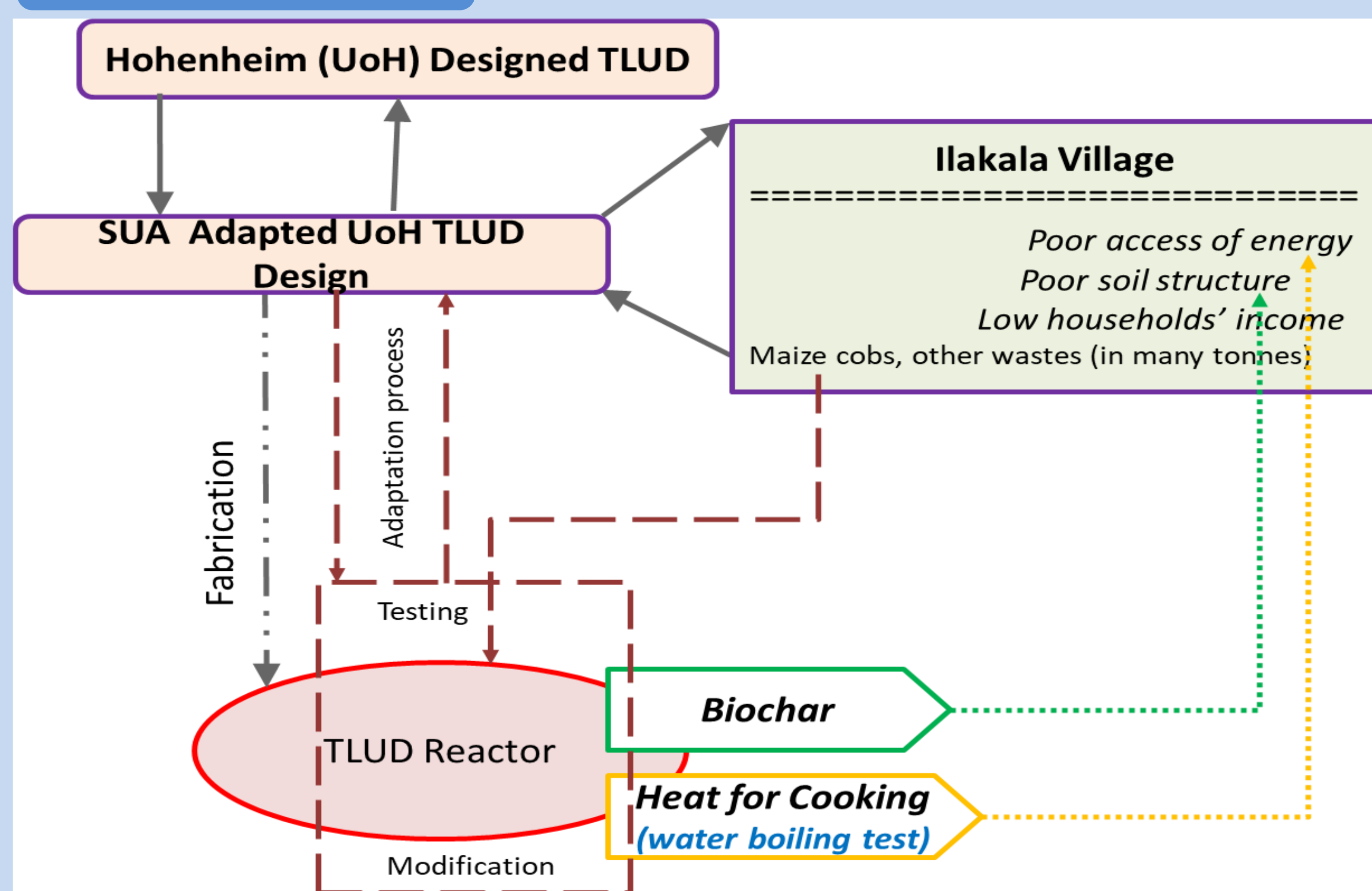
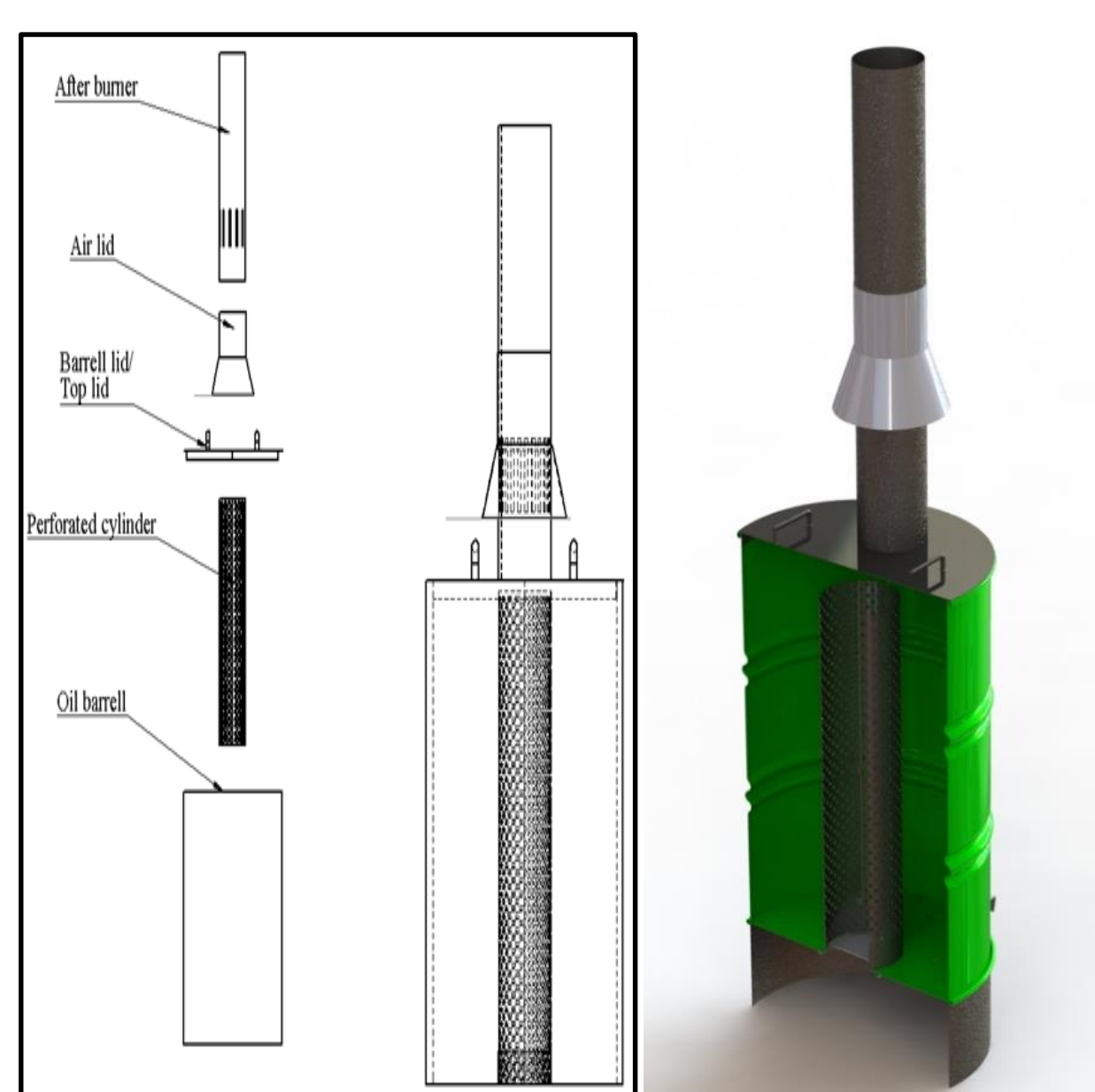


Figure 1: Conceptual Framework of the Study



TLUD reactors at SUA TLUD reactor in Ilakala



Results

• Participative action research:

The participative collaboration resulted in the gradual adaptation of an existing 200 litre Top-Lit-Up-Draft (TLUD) reactor where a) the first version was solely used for biochar production but then after two reflective stakeholder-scientist consultations b) a 2nd version included a cooking component, and then c) a 3rd version included a 2nd cooking component, heat insulation, and a shorter TLUD size.

• Technical TLUD reactor features:

- i) 2nd version: on average boiled 4.5 litres of water at 93 °C within 44 minutes; 3rd version: on average boiled 4.0 litres of water at 92 °C within 35 minutes .
- ii) 2nd version produced 0.30 kg of biochar per kg of cobs fed, totalling 6.0 kg per reactor minimal filling; 3rd version produced 0.39 kg of biochar per kg of cobs fed, totalling 6.0 kg per reactor filling

• Economical TLUD reactor features:

- i) Material and fabrication costs € 68⁽²⁰¹⁵⁾ and € 66⁽²⁰¹⁶⁾ for 2nd version and 3rd version respectively;
- ii) Income generation: When both TLUD reactors are operated on business terms (3x daily biochar production, biochar selling, and simultaneous fuelwood saving) they may generate € 37 and € 38 income per month respectively.

Conclusions

Sharing information between scientists and local stakeholders is vital for smooth implementation and ownership creation of these types of innovations. The reactor produces biochar and heat for cooking simultaneously. The 3rd TLUD reactor version is adapted to local needs, also it is economically and technically feasible at minimal costs in Tanzania.

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