



Revolutionary New Stove... Engineering Change

It's a cooker, a fridge and a generator in one — and it could have a huge impact on the lives of people in the world's poorest communities.

Across the world, two billion people use open fires as their primary cooking method. These fires have been found to be highly inefficient, with 93 per cent of the energy generated lost. And when used in enclosed spaces, smoke from the fires can cause health problems.

The £2m SCORE (Stove for Cooking, Refrigeration and Electricity) project brings together experts from across the

world to develop a wood-powered generator capable of both cooking and cooling food. By developing an affordable, versatile domestic appliance SCORE aims to address the energy needs of rural communities in Africa and Asia, where access to power is extremely limited.

Led by the Department of Electrical and Electronic Engineering at The University of Nottingham, the project team includes Manchester, Queen Mary (London) and City (London) Universities with the charity Practical Action and will use thermo-acoustic technology to convert biomass fuels into energy, powering the stove, fridge and generator.



One weeks wood supply



Preparing food in Nepal



Boiling water on a wood fire



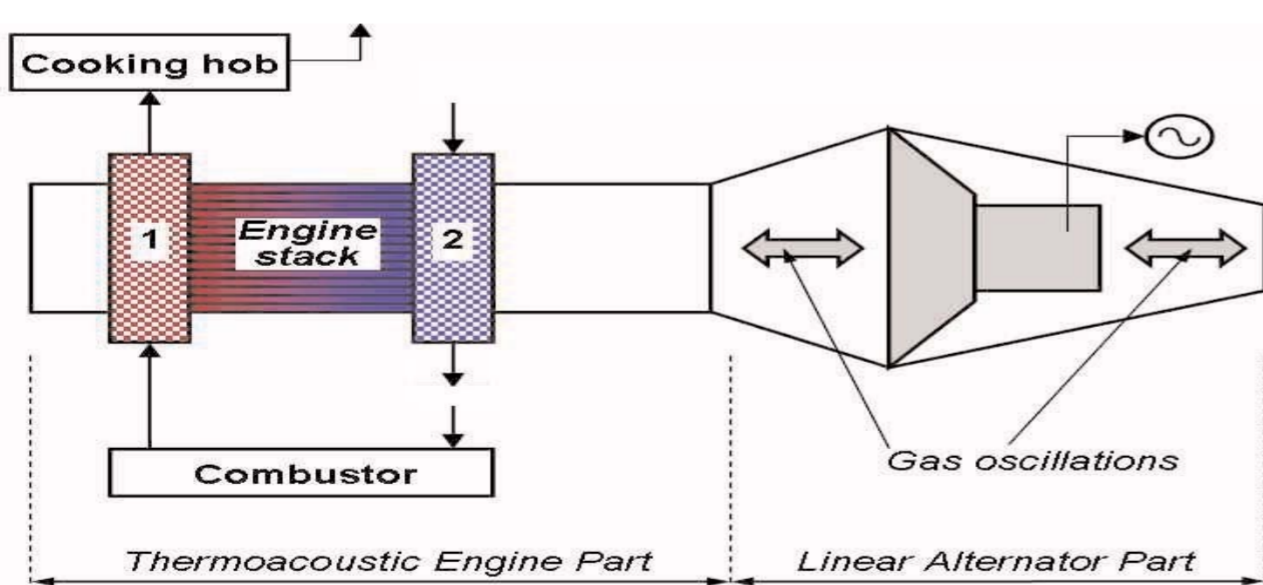
Three stone stove in Africa

Research innovation:

- Research into the combination of the thermo-acoustic engine, linear alternator and cool box in a single device, powered by a biomass stove.
- Design of a rugged and inexpensive linear alternator that could be easily mass-produced.
- Overall system design from the view point of low cost, application of indigenous materials, use of local manufacturing skills and simplicity of assembly, which are major research issues compared to the current high-cost and thermo-acoustic systems.

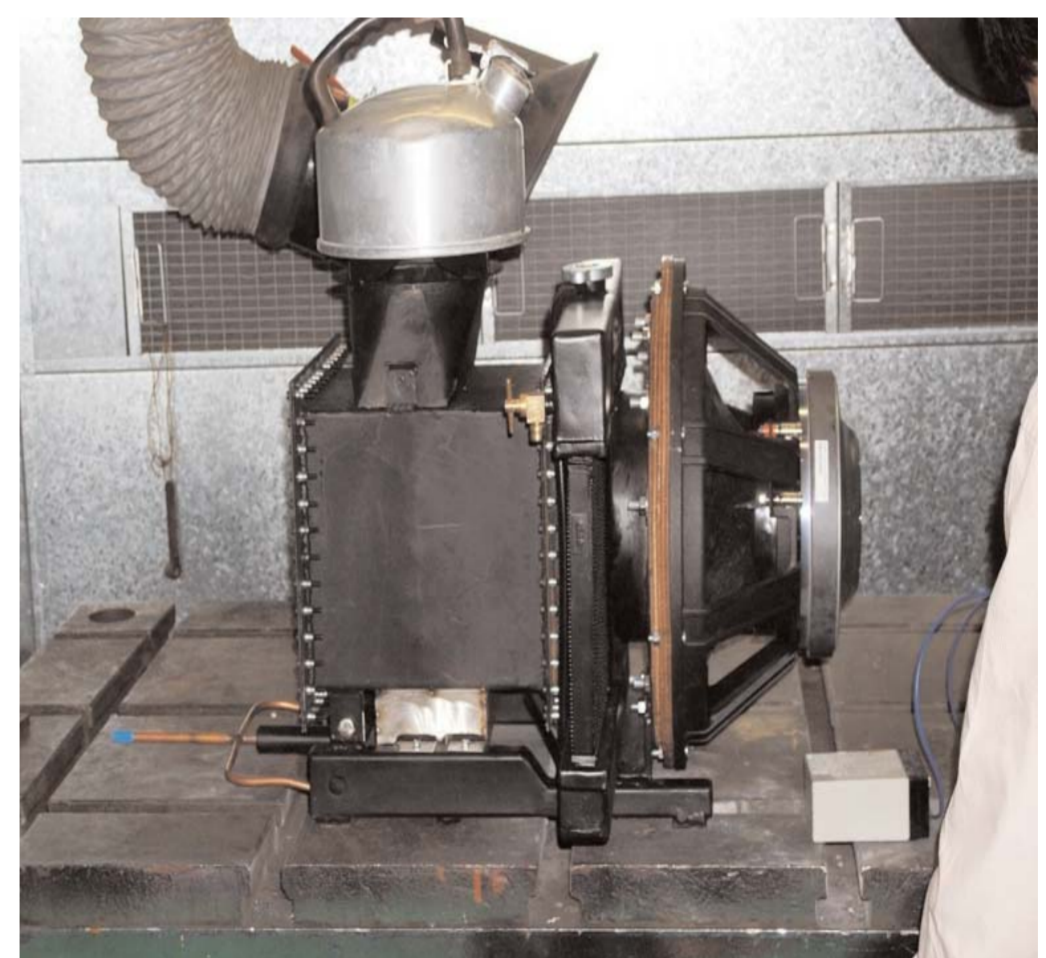
Standing wave thermo-acoustic engine:

- Fractional wave length design.
- Combustor: wood burning, high efficiency, low emissions and used for cooking.
- Hot heat exchanger (1): 500°C gas temperature.
- Stack: heats and cools gas packets.
- Ambient Heat Exchanger (2): water cooled, also used for cooking.



Demo #0:

- Prototype made and tested using off the shelf components such as car radiator, loudspeaker and caravan oven burner.
- Loudspeaker used as linear alternator to meet the target cost (£4.50).



Demo #0: Thermo-acoustic driven standing wave generator



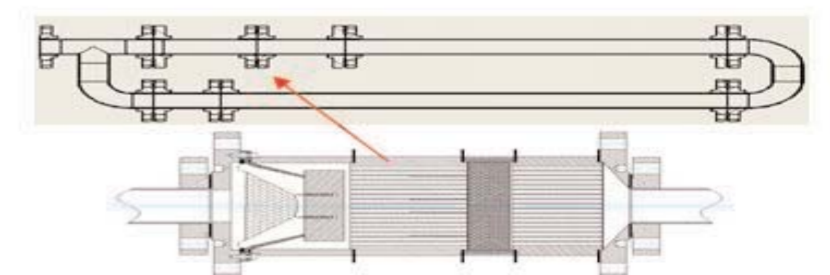
Linear Alternator: Nottingham



Combustion Rig: QMUL



Stove Design: City



Travelling wave design: Manchester

Score Goals:

- World class research, impact on developing countries.
- Promotion of businesses, exploitation.

Score Technical Targets:

- Cost: target (£20) per household in 1 million quantities, weight: 10-20kg, power output: 150 W (electrical), 1.6 kW_{th} for cooking and 0.75 kW_{th} for simmering.
- Fuel: consumption 1 kg/hour, wood, dung and other bio-mass.