urban agriculture AUSTRALIA

Rocket Stoves

What is a Rocket Stove?

Rocket stoves are a type of fuel-efficient device, named in the 70's, but dating back millennia in concept. A super-hot chimney above the fire draws the flames sideways and up, blending hot fuel and air into a quick, hot, clean-burning fire that takes little wood and leaves little residue.

How does a Rocket Stove work?

The rocket stove achieves efficient combustion of multiple fuel types at high temperature by ensuring a good air draw into the fire, controlled use of fuel, complete combustion, and efficient use of the resultant heat. It has been used for cooking purposes in many energy poor locales (notably Rwandan refugee camps) as well as for space and water heating.

The rocket stove's main components are:

- Fuel feeder: into which the unburned fuel is placed and from which it feeds into the combustion chamber
- Combustion chamber: at the end of the fuel feeder, where the fuel burns
- Chimney: a vertical chimney above the combustion chamber to provide the updraft needed to maintain combustion
- Heat exchanger: to transfer the heat to where it is needed.

The fuel feeder can be horizontal, with additional fuel added manually, or vertical, with appropriately sized fuel automatically fed. As the fuel burns in the combustion chamber, convection draws new air into the combustion chamber from below, ensuring that any smoke from smoldering wood near the fire is also drawn into the fire and up the chimney. The chimney can be insulated to increase the temperature and improve combustion; according to studies this can increase efficiency by up to two percent. In a rocket mass heater, the heat is passed to a heat exchanger to ensure the efficient use of the generated heat.

Rocket stoves address the following Permaculture Principles – Use Small and Slow Solutions | Produce No Waste | Use and Value Renewable Resources and Services

With their efficient use of a small amount of fuel that can be readily grown or gathered from renewable sources and the fact that they can be made from either recycled materials or natural building materials, rocket stoves are a fantastic permaculture solution to many problems.

History of the Rocket Stove

A precursor to the rocket stove was the argand lamp, which was patented in 1780. This was a major development of the traditional oil lamp, which introduced a glass chimney above the flame to increase air-flow. As well as being used for lighting, this design was also used for cooking and heating water due to its "affording much the strongest heat without smoke".

Dr Larry Winiarski began developing the Rocket Stove in 1980 based on a VITA stove, designed by Sam Baldwin, and re discovered the principles of the systems developed by the Romans in hypocaust heating and cooking systems. TWP and AHDESA were winners at the Ashden Awards for Sustainable Energy in 2005 in the "Health and Welfare" category for their work in Honduras with the "Justa Stove", based on principles of the rocket stove. Aprovecho were winners of the Special Africa Award at the Ashden Awards in 2006 for their work with rocket stoves for institutional cooking in Lesotho, Malawi, Uganda, Mozambique, Tanzania and Zambia

Cooking

The rocket stove was originally developed for cooking, where a relatively small amount of continuous heat is applied to the bottom and sides of a cooking pot. Stoves can be constructed from brick, recycled steel cans, or steel sheet metal, or can be purchased.

Although rocket stoves are found more commonly in third world countries where wood fuel sources are more scarce, they have seen in recent years increased use in developed countries, such as the United States. Some are small for portability, with insulation inside a double-walled design and a chamber for partial biomass gasification and additional mixing to increase BTU production and to provide a cleaner, more complete burn. The advantage of rocket stoves is the very little fuel they need, such as wood and dry weeds, to be able to cook a whole meal with it, keeping the air cleaner with less hydrocarbons and carbon monoxide.

Room heating

The rocket mass heater uses the rocket stove principle within a system designed to both heat air directly and also to transfer much of the heat from the flue gases into thermal energy storage, often made of cob. Described in detail in 2006, these heaters are becoming popular with DIY builders, in natural buildings and within permaculture systems.

Water heating

Rocket stoves can be used to heat water via a heat exchanger which transfers heat to a body of water in a nearby container.

Websites for more information:

www.rocketstoves.com

www.npr.org/2011/02/09/133598036/engineers-hone-clean-energy-stoves-for-the-world

www.permies.com/forums/f-55/wood-burning-stoves

For further information on this topic

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