# The Origins of the Juntos Gasifier Stoves: Short Version 9/02

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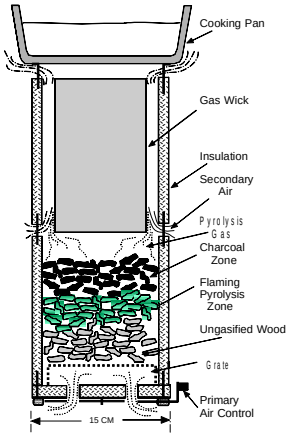
The heating of biomass can cause chemical decomposition ("pyrolysis") that releases gases that can subsequently be burned as "secondary combustion." This process occurs nearly simultaneously in regular fires, making the two stages difficult to see or to control. But when the gases are generated but not burned immediately, the pyrolysis process is more easily understood, seen, and controlled. This process is informally known as "gasification." Commercially viable gasification has long been understood and used in industry and even in transportation, but not for small applications such as a household stove.

In 1985 on a trip to South Africa, gasification expert Dr. Thomas B. Reed awoke one night thinking of a very small gasifier for the domestic stove needs of impoverished people. For ten years he worked to develop the IDD (Inverted Down-Draft) natural convection gasifier stove. In 1995 Dr. Ronal Larson joined the effort with a focus on the gasifier's capacity for producing charcoal as a valuable by-product in a household stove. After testing and publications (see fig. below-left) but no real success for applications, they stopped that work in 1995. However, in 1998 Dr. Reed began work on a smaller, forced convection model with a fan.




Reed-Larson 1995

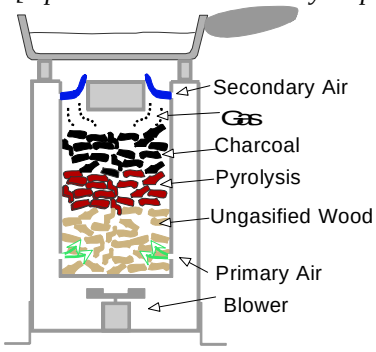
Anderson 2002-a

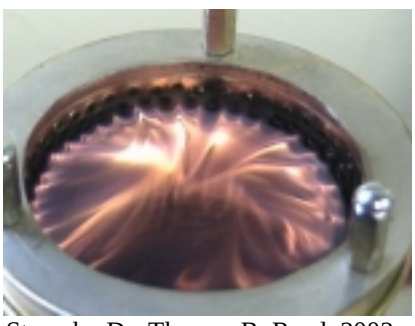
Anderson 2002-b – (Gasifier slides out)

In 2001, Dr. Reed lit his early prototype forced-air gasifier stove on a kitchen table for Dr. Paul S. Anderson and two others to see. Sufficiently impressed, Dr. Anderson started experimenting, received on loan the original IDD gasifier, learned much from the "Stoves List Serve," and subsequently devised numerous modifications that resulted in the Juntos stove concepts. Those modifications (some are visible in the figures above) include different stackable units (including a modified "rocket stove") in a heat column over a gasifier unit with an airpipe, with smaller holes for entrance of secondary air, with pre-heated secondary air, with a tapered chimney, and with independent structural components for the stove body. The Juntos gasifier chamber is removable and, therefore, can be emptied to save the resultant charcoal, re-loaded with biomass, re-lighted, and re-inserted into the heat column. Design improvements are continuing.

Meanwhile, Dr. Reed returned to his forced-air designs with the intention to make a stove for the affluent North American camper market. He was highly successful and produced in early 2002 the "WoodGas Camp Stove" that has a battery-powered fan and can produce an impressive blue flame for sustained periods (figs. below). Some modifications necessary for African applications are relatively minor.

The efforts of Drs. Reed and Anderson are brought together by the not-for-profit Biomass Energy Foundation (BEF) in its efforts to secure funding assistance for the Juntos Gasifier Stoves Project. The target area is southern Africa where Dr. Anderson has been teaching and researching geography education since 1998 as a Fulbright Professor and as a Rotary University Teacher Grantee, and ironically where Dr. Reed first conceived the household-size gasifier stove. *[Up-dates will occassionally be posted via links to www.ilstu.edu/~psanders ]*



Three figures (a, b, c) showing the BEF forced-air WoodGas Camp Stove by Dr. Thomas B. Reed, 2002.