The Challenge:

Elimination of

unacceptable emissions of

CO and PM (carbon monoxide and particulate matter) from

burning wood and other solid biomass fuels for

household energy, especially in

low-cost, user-friendly cookstoves.

Dry biomass can be gasified.

"Woodgas" is defined as the combustible gases that can be created from wood and other dry biomass via heatrelated processes of pyrolysis and char gasification.

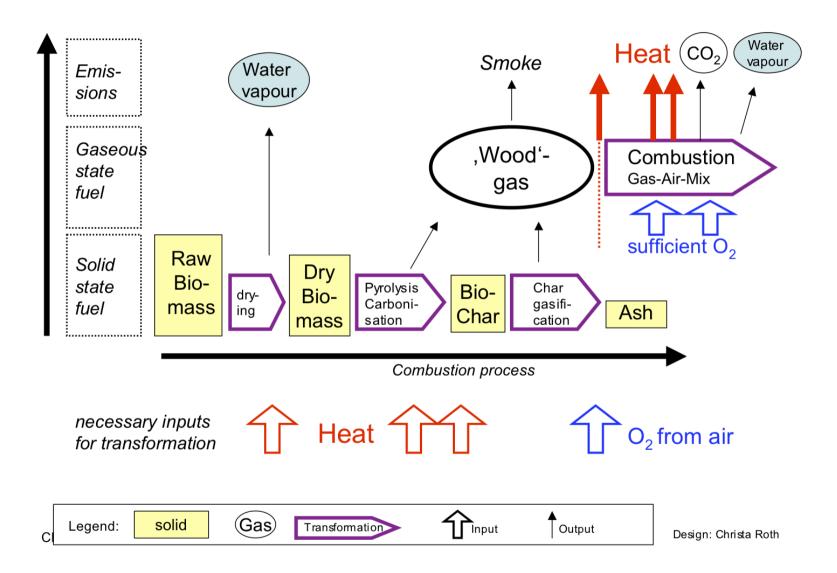
Wet biomass can be digested.

"Biogas" is commonly reserved for gases from anaerobic digestion of wet biomass.

Gasifiers:

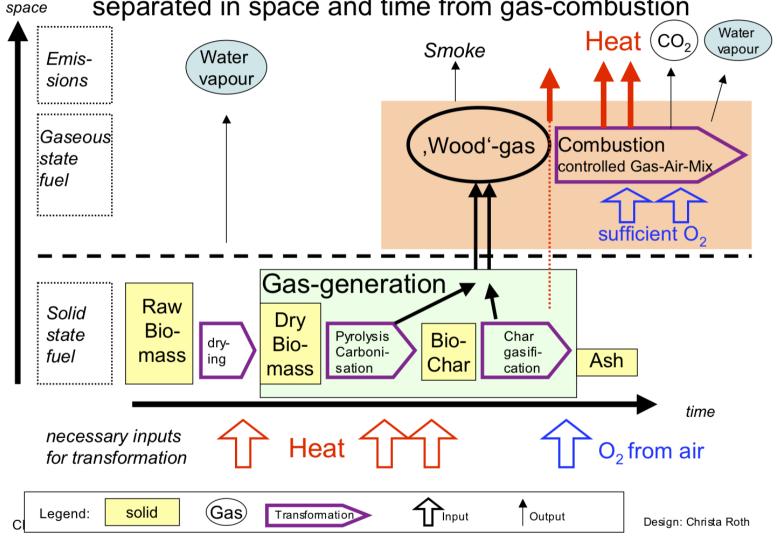
Devices in which the dry biomass is transformed into combustible gases in processes distinctly and controllably separate in time and location from the eventual combustion of the gases.

What happens when biomass is burnt?



"Pyrolysis is a thermochemical decomposition of organic material at elevated temperatures without the participation of oxygen"

Biomass gasification: Gas-generation controllably separated in space and time from gas-combustion



Microgasification

Fig. 21 Pot The pot (cookware) is supported by "stove structure" The riser can be connected not shown here. to the concentrator lid or to the stove structure. Riser / Connector / Coupler Concentrator Lid 7 to 13 cm (3 to 5 in.) height Flame 20 to 21 cm (8 in.) Handle of Outer Cylinder Concentrator ~19 x 30 cm Lid Concentrator Lid (7.5 x 12 in.) 7.5 cm (3 in.) Upper Spacer (1 of 4) Fuel Cylinder (Replaceable) Handle of Gasifier 15 x 25 cm Gap for (6 x 10 in.) Secondary Air 1 cm (0.4 in.) Fuel Container (Lower Chamber) 15 x 10 to 18 cm (6 x 4 to 7 in.) Grate -Secondary Air Primary Air Primary Air Duct Lower Spacer (1 of 4) 5 cm (2 in.) diameter Fuel Container / Cylinder Support

 \rightarrow Combination of clean cooking and biochar production (e.g. to be used for Terra Preta) at the same time

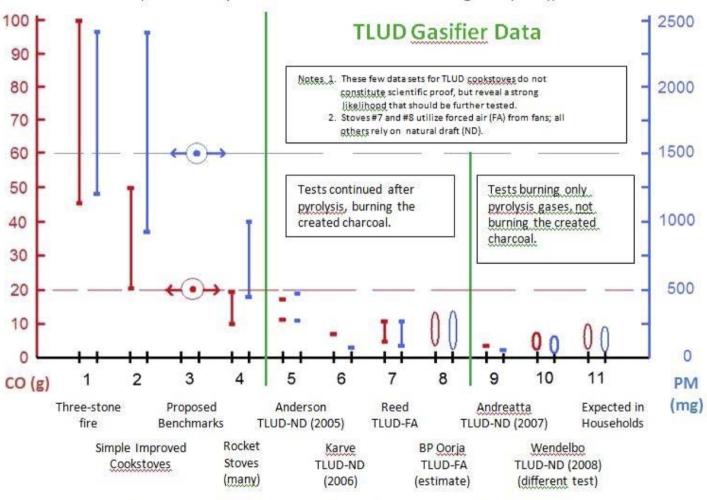
Dry biomass is transfered into a woodgas (which is burned directly) and charcoal via gasification-pyrolysis, a thermo-chemical process

Open source design by Paal Wendelbo Design by Paul S. Anderson

Quelle: Anderson(2009)

Emissions of Carbon Monoxide (CO) & Particulate Matter (PM) from TLUD (Top-Lit UpDraft) Gasifiers and Other Cookstoves

(Measured by the Standard 5-Liter Water Boiling Test (WBT))



Prepared by: Anderson, Wendelbo, Reed, and Belonio (2008) for the "Beyond Firewood" Conference.

THANKS for teaching & sharing

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Programme for Poverty oriented basic energy services

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