

TLUD and TCharbon Stoves for Sustainable Haitian Development

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Problems and Solutions

- The **deforestation** of Haiti by charcoal production for cooking stoves is internationally infamous.
- Simplistic approaches with modified **old technologies** are unlikely to solve the problems.
- **Do not change the cooking habits of the people.**
- Truly innovative solutions are needed, including:
 - Abundant **dry biomass fuel** that is not based on cutting trees.
 - **Clean combustion** that is cleaner than charcoal burning.
 - Faster initial temperatures, followed by **charcoal cooking!**
 - **Low cost** with totally Haitian-made stoves and fuels = jobs.
- **Needed: Charcoal stoves that make their own charcoal!**
- That solution:

TLUD stoves with TCarbon techniques

TChar and TCharbon

- The names **TChar™** and **TCharbon™** refer to a **new combustion configuration** and its usage primarily for cookstoves.
- The “T” stands for **TLUD technology** used in this stove, and the “Char” stands for incorporated **charcoal-burning stoves**.

The “Charbon” in TCharbon

- Lower part of the stove is a charcoal burner:
 - sidewalls to contain the charcoal
 - a grate providing air inlets from underneath
 - complete with any pot-rests, handles, etc.
necessary for it to be a functional, free-standing charcoal-burning stove.



The “T” for TLUD in TCharbon

- Upper part of the stove is a TLUD gasifier that uses the charcoal burner as its base for air entry:
 - vertical cylinder to hold dry biomass fuel
 - ignited at the top
 - complete with pot-rests, handles, concentrator ring, etc. to be a functional TLUD gasifier stove.



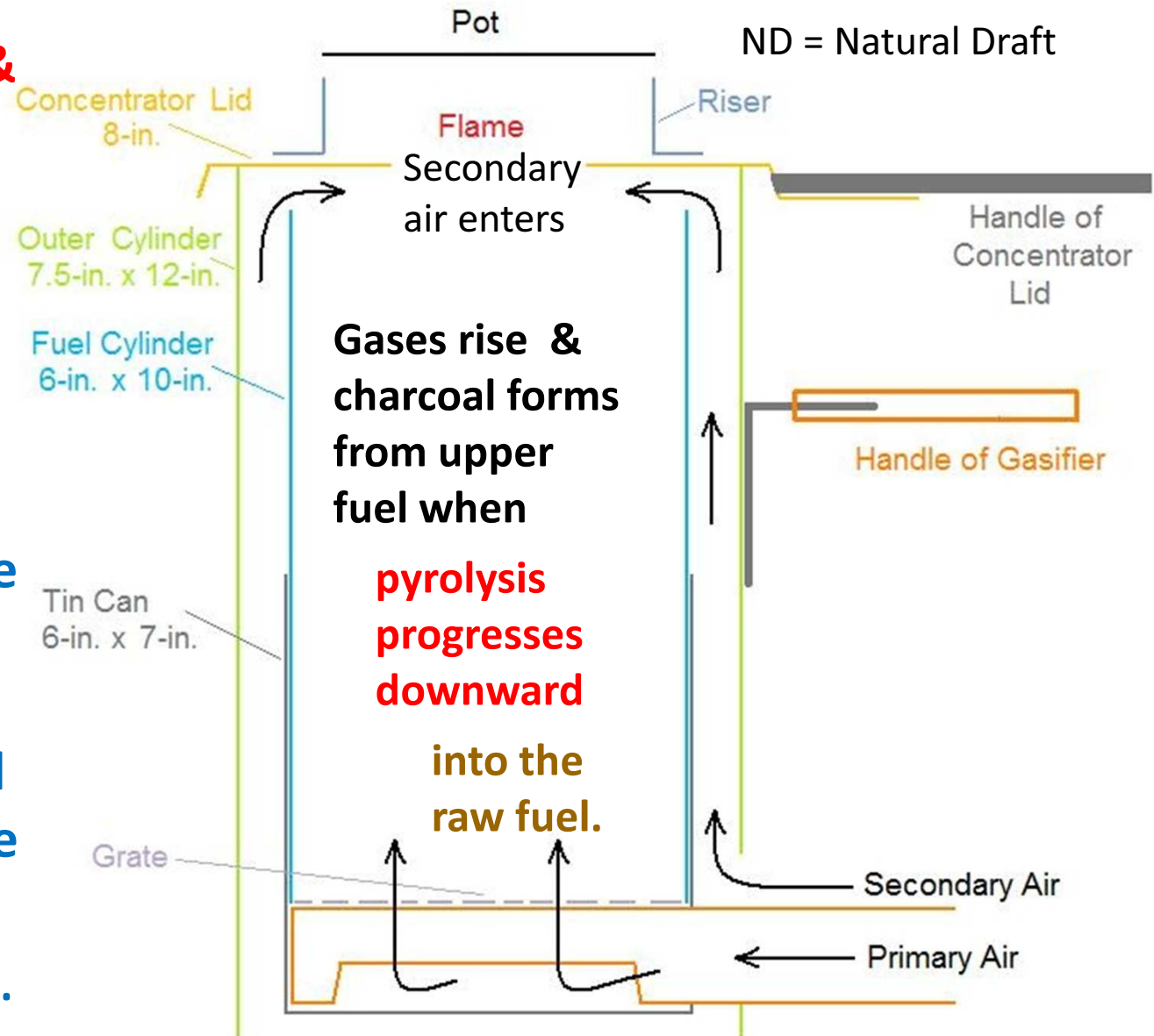


“Champion” TLUD-ND gasifier (2008)

Combustion zone & heat application

“Reactor” or gas generation device or pyrolysis unit, including fuel chamber inside.

In TChar stoves, the bottom section is replaced with a functional charcoal stove to receive the char when the top section is removed.



Operating a TCarbon Stove

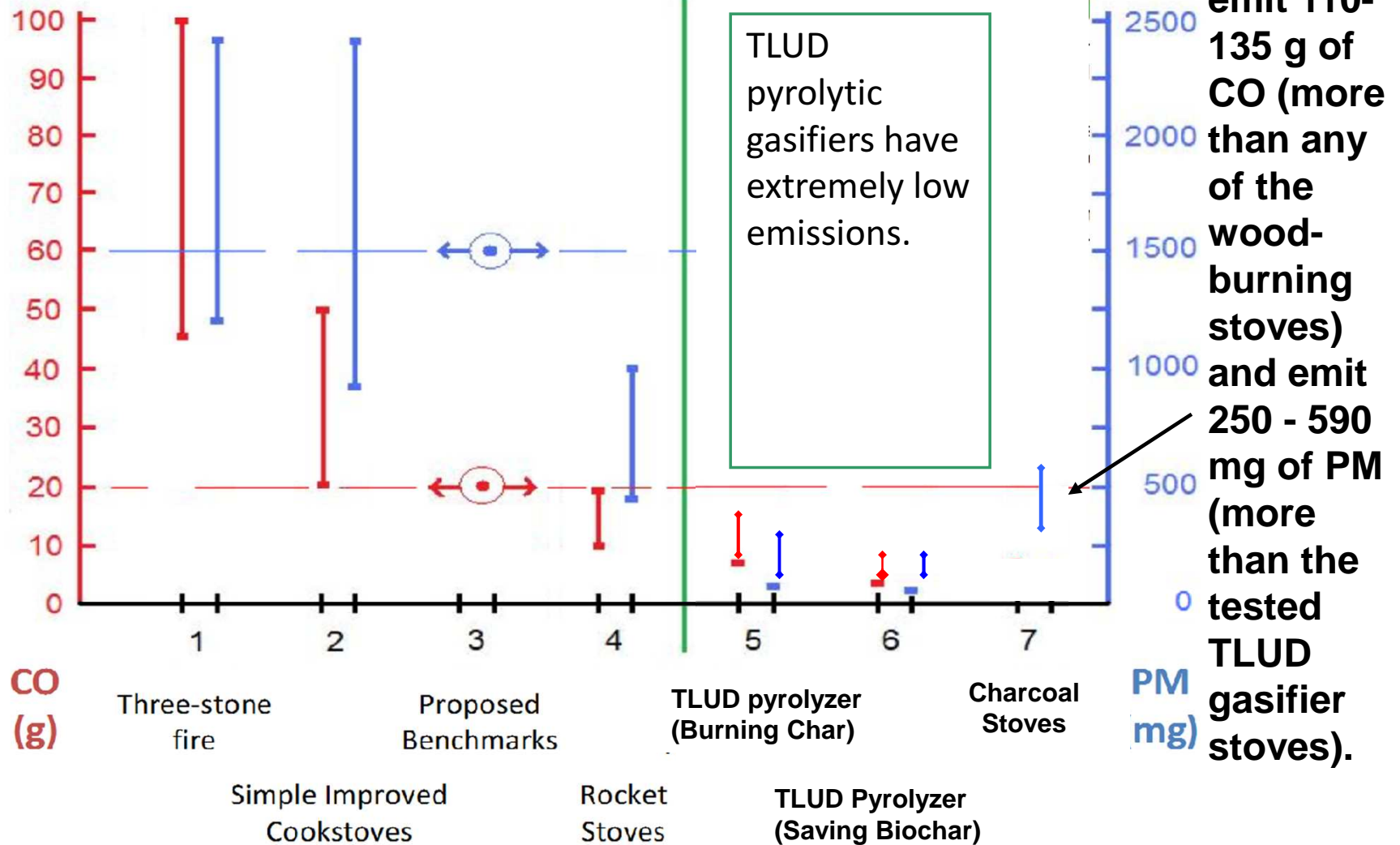
- Properly loaded and ignited according to TLUD stove operations, the fuel is carbonized by a descending pyrolytic front, the most distinctive characteristic of TLUD technology.
- Being a batch operation, the pyrolysis/carbonization is completed under known conditions including fuel type, quantity, and air control.
- At that time the upper part (the TLUD section) can be lifted off and the created charcoal spreads over the base unit that is then used as a charcoal stove to continue the cooking.

Excellent Clean Combustion

- Low emissions -- lower than standard charcoal stoves because of the fast start. See the graph of emissions testing on the next slide.
- OKAY for urban usage. (Cleaner than charcoal.)
- The authors Roth and Anderson are conducting emissions and efficiency tests this week at Zamorano University in Honduras.

CO & PM Emissions From Cook Stoves

(Measured by the Standard 5-liter Water Boiling Test.)



Fuels and Their Costs

- TLUDs can use a wide variety of dry biomass
- Many are “free” for the efforts of those who will collect them
- Abundant in most settings
- Supply lines will respond to market demand
- In Haiti, the opportunity exists for fuel sources to play an enormous role in stopping soil erosion...

Vetiver as Fuel for TCharbon

- Vetiver not only holds soil on mountainsides, its roots run 3 meters deep and collect leaves, debris, and eroded soil from above – creating natural terraces.
- Production of vetiver pellets for use in TCharbon creates new jobs in Haiti/converts charbonnierres to participants in sustainable industry.



Haiti Reconstruction International

Dedicated to training Haitians to run sustainable businesses that conserve resources and improve food security and health

www.haitireconstruction.ning.com

Haiti Reconstruction International

- HRI experts believe it is imperative for Haitians to mass produce stove kits in order to create large-scale shift from charcoal to biomass gas stoves – will yield conformity and best efficiency.
- Access to a large network – HRI already has contact with many groups working to build businesses in their communities
- Each group can sponsor a team of 5 community members for training and assistance starting their business
- By training 6 groups per week for 2 years, HRI program could produce 600 new businesses across Haiti
- Capacity to produce 1 million stoves in first 3 years, and over ½ million each year after

HRI-Ducasse Training Center

- Understanding the TLUD concept
- Hands-on use with varieties of biomass
- Installing stoves in households and customer service/education
- Business training & professional development
- Focus on importance of vetiver hedgerows for Haiti's environment – from preventing erosion to restoring soil fertility with biochar

Summary

- The TChar method **cooks first and fast with pyrolytic gases** (created at the location) and **then cooks with charcoal** (created at the location).
- In essence, the TChar techniques and the TChar stoves **combine the best features** of both TLUD pyrolytic gasifiers (which make charcoal) and charcoal-burners (which consume charcoal).
- HRI-Ducasse Training Center will make it possible to **make biomass gassifier stoves a reality** in Haiti.

Assistance is Available

- Caution: The concept is easy to implement, but knowledge about both TLUD and charcoal stoves is essential to optimize each operation within the TChar configuration.
- Consult the authors and these websites for abundant assistance: www.bioenergylists.org and www.drctlud.com.
- For more information on the HRI-Ducasse Training Center, vetiver grass as fuel, and its role in preventing erosion, consult: www.haitireconstruction.ning.com