

CHAB Camp: Hands-on development of “Combined Heat And Biochar” devices



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What is CHAB?

CHAB = Combined Heat And Biochar

Society has hundreds of devices that take biomass and yield **Useable Heat and Ash**.

If Society had a suite of devices that took biomass and yielded **Useable Heat and Biochar**, how would that affect BOTH heat generation and biochar production?

CHAB Camp 2010

Hosted by NESFI (New England Small Farm Institute)
Belchertown, MA USA

8 attendees, 3 instructors, 5 support persons

4.5 days of Learn, Build and Burn

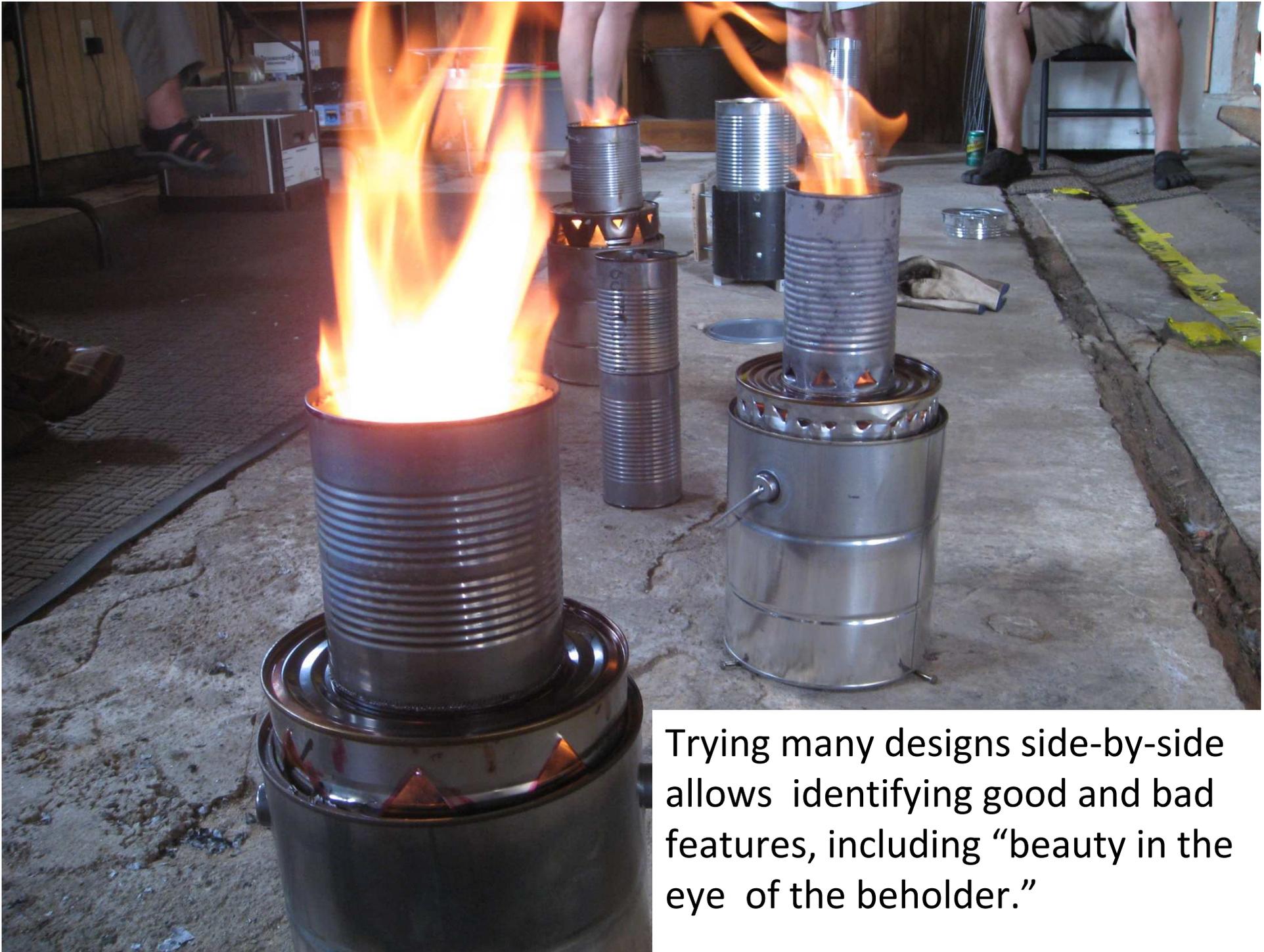
Blend of classroom theory and hands on
practice – “talk the talk, then walk the walk”

Focus on TLUDs and three new CHAB designs.



A glass TLUD (to show the pyrolysis front descending) soon gave way to designing and operating variations of the standard "1G Toucan."





Trying many designs side-by-side allows identifying good and bad features, including “beauty in the eye of the beholder.”

Learning took place at many levels and in varied locations. TLUD gasifiers were operated inside a well-ventilated building and also outside.





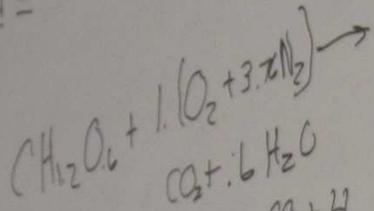
With biochar-making **stoves** as a theme, the need to host a party and cook food for many became assigned homework.



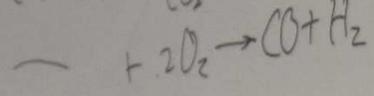
TLUD lamps provided lighting for a feast while conversation centered on designing CHAB devices after tonight's celebration.

Wood = $C H_{1.2} O_{0.6}$

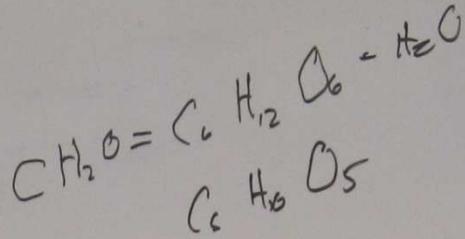
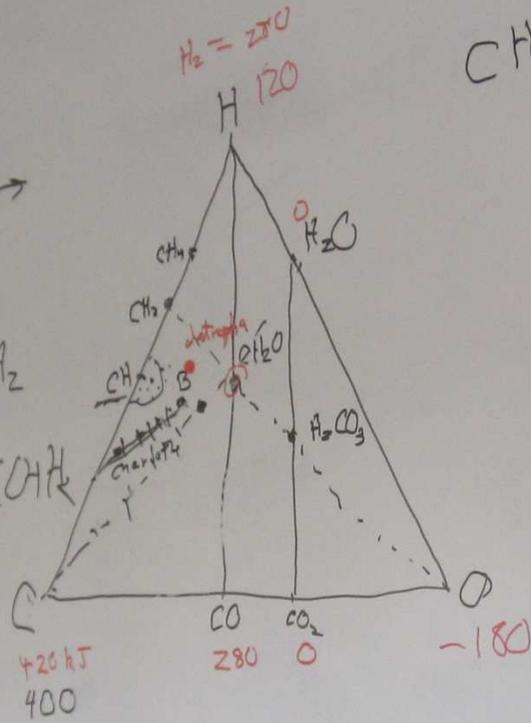
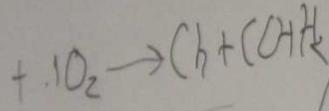
Combustion



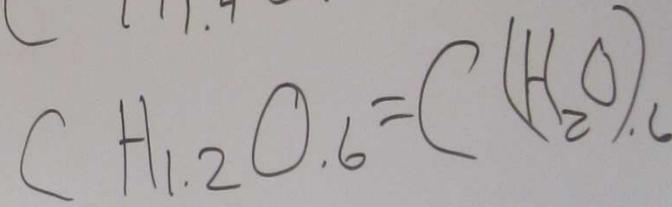
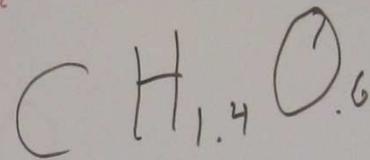
Gasification



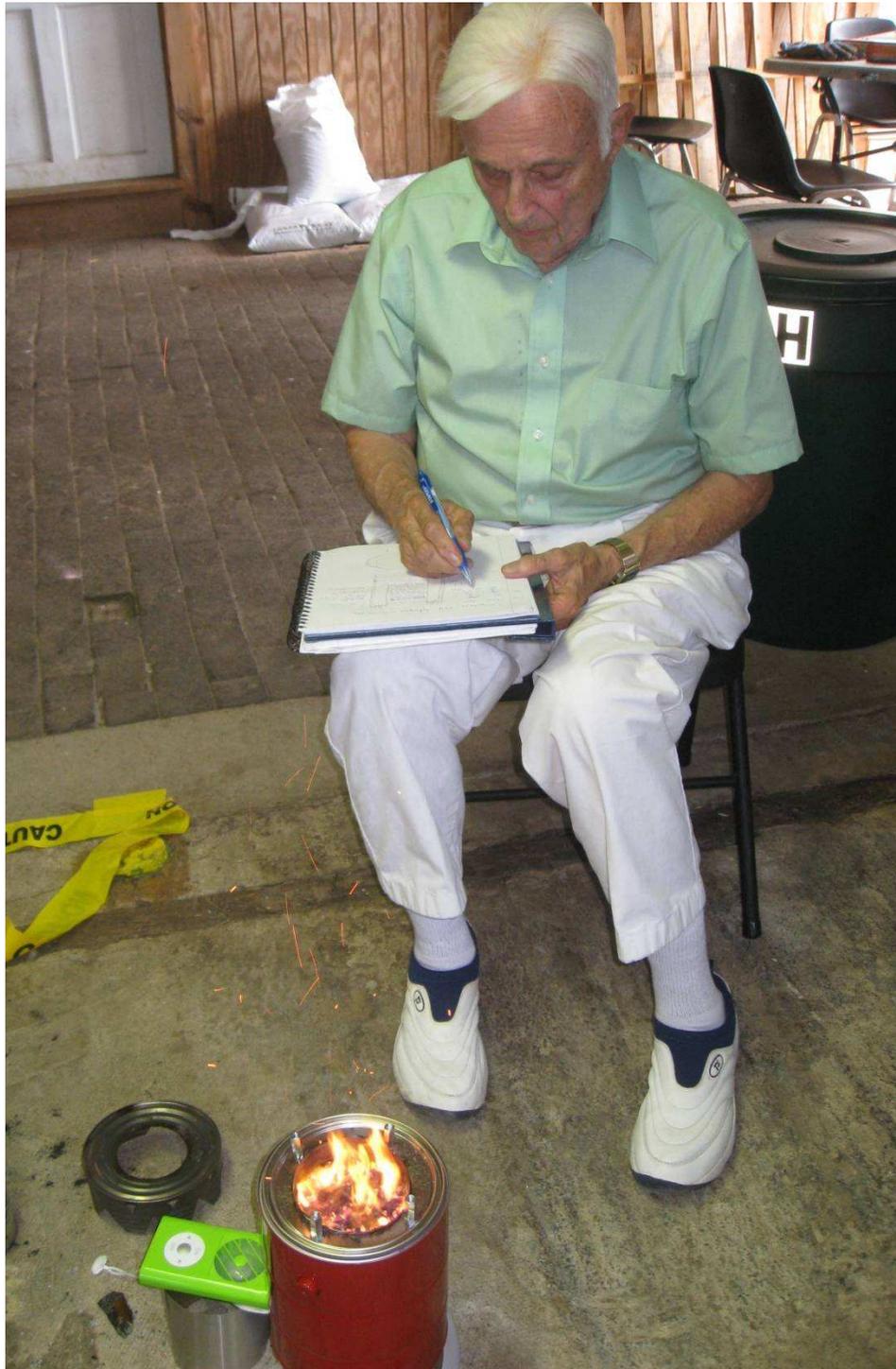
F.P. (T.L.U.D)



$$C H_2 O = 420 + 240 - 180 = 480 \frac{kJ}{mole}$$



Theory and practice soon became one. Substantial scientific content was provided by the three instructors from the Biomass Energy Foundation.



Teachers, including TLUD originator Dr. Tom Reed, soon became students, and “seeing is believing”.

Sometimes, the only way to learn “practical knowledge” is to do it.





The “SOAP Test” is done by rubbing the biochar on your hands to get some char dust to test.

Amanda “volunteered”



Rinse your hands under COLD water, rubbing your hands together to rinse off the char dust.



If the biochar has low mobile matter, then your hands will rinse clean without Soap. If you need Soap, then the biochar contains tars and leachable sugars that will enter the soil during the first one or two growing seasons.

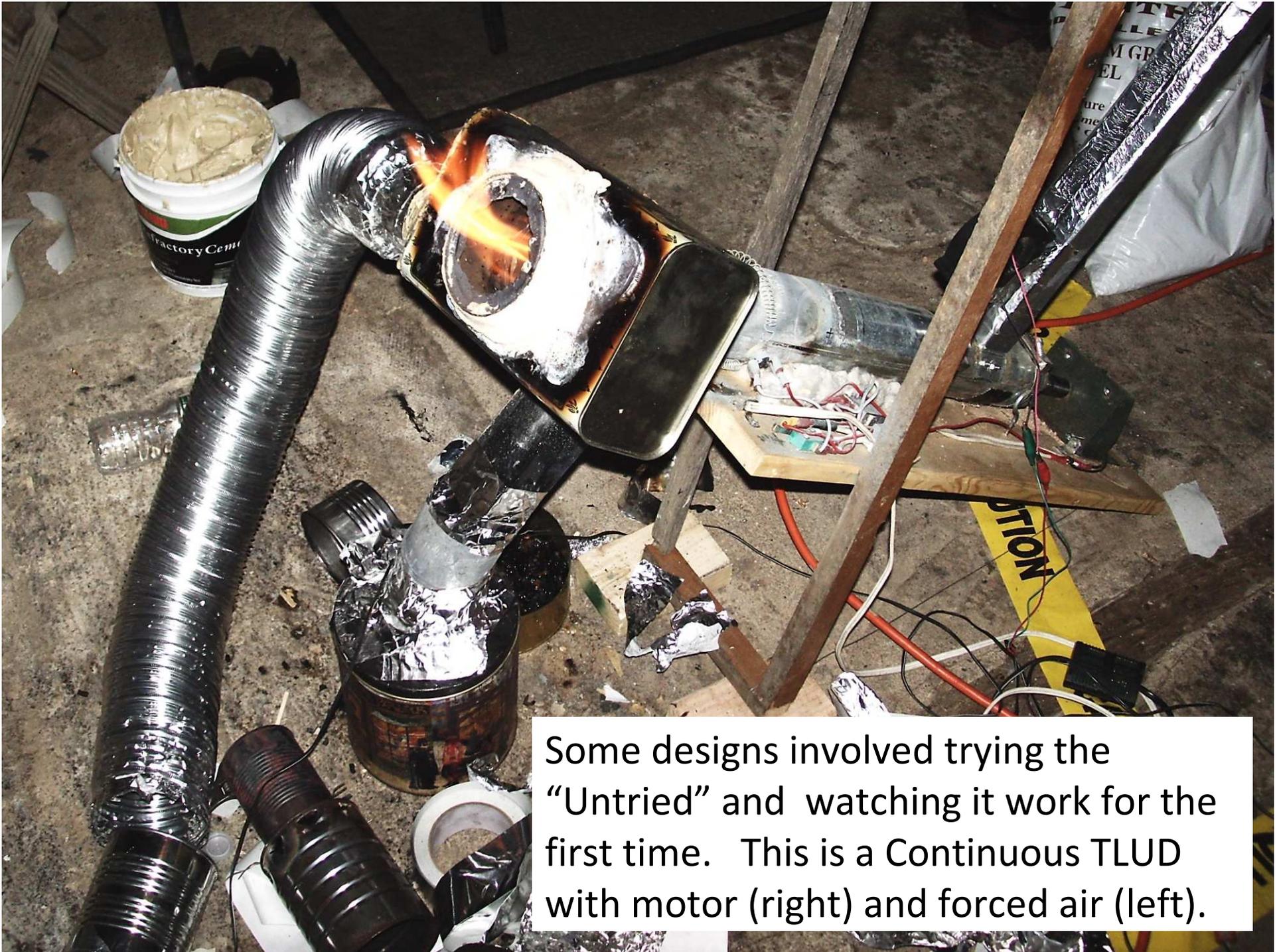
A woman with brown hair, wearing a white tank top and a blue headband, is smiling and showing her hands to the camera. Her hands are covered in a thick, white, soapy lather. She is standing in a kitchen with a wooden countertop. In the background, there is a white electric fan, a window with a wooden sill, and various kitchen items like bottles and a sink. A text box is overlaid on the right side of the image.

Passing the “SOAP Test”
is a sign of good biochar.



An “Adam Retort” arrived to show biochar production, but use of the heat was not shown.

Some designs involved modifying existing devices to accomplish “Combined Heat And Biochar”



Some designs involved trying the “Untried” and watching it work for the first time. This is a Continuous TLUD with motor (right) and forced air (left).



As soon as you work out the heat source, you work out the application.

CHAB Camp – where the “OLD meets the NEW” and “Theory meets Practice”.



Was it fun? – Yes. Did we learn something? – Yes, again

Future of CHAB Camps:

- **Biomass Energy Foundation (BEF) will offer additional camps.**
- **Some might be called SHAB Camps, meaning Stoves, Heat And Biochar**
- **Multiple CHABs/SHABs could occur each year at varied locations. At least one will be at NESFI in the summer of 2011.**
- **Specialized CHAB Camps could be focused on applications such as:**
 - **crop drying, or hot water with storage, or institutional cooking.**
- **Anyone interested in attending or sponsoring a CHAB or SHAB Camp should contact the authors of this paper.**

Thank you. Muito obrigado.

- **Contact information for :**
 - Dr. Paul S. Anderson “Dr. TLUD”**
 - Email: psanders@ilstu.edu**
- **Two other presentations at IBI-Rio:**
 - TLUD cookstoves for biochar production**
 - CHAB removal of 1 Gt/yr Carbon**
- **I will assist in all countries, including**
 - Uganda in November 2010**
 - Peru in February 2011 for PCIA Conf.**