



*After water,
food, and shelter,
surely a supply of
energy for daily living
is the quintessential
element in reaching
a better life.*

*Dr. C. A. Stokes, Energy
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Clean Burning Ethanol Stoves

Our Mission is to promote clean-cooking alcohol stoves and fuels for commercial application under local ownership. We are currently engaged in projects in Ethiopia, Nigeria, and Brazil. We wish to facilitate projects in other countries where alcohol fuels can be sourced cheaply and a stove-fuel market can be established.

The Problems with Smoky Stoves:

Health: Indoor air pollution is responsible for almost 3% of illness globally and an estimated 1.6 million deaths per year, with nearly 800,000 deaths among children under 5. Many of these deaths are in Africa.

Environment: Overharvesting for fuelwood and charcoal leads to deforestation and desertification. High gas and soot emissions produce greenhouse gases and black carbon in the atmosphere, which adds to warming.

Safety: Women and children face harassment, abuse and even rape while gathering firewood. Kerosene and LPG are dangerous, prone to flare-up and explosion. There are many cases of children poisoned by drinking kerosene.

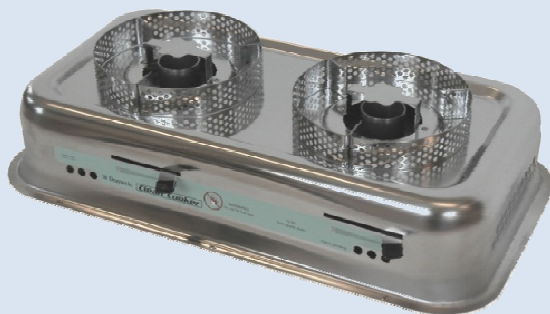


Addis Ababa woman cooking on the 2-burner CleanCook stove in her home.

The Promise of Alcohol Fuels: Ethanol & Methanol:

Alcohol fuels are safer and less polluting than petroleum fuels. They are relatively benign if spilled in the environment. Alcohol fires are extinguished with water. Well-designed alcohol stoves produce no harmful emissions and are powerful generators of carbon credits. Alcohol fuels are produced locally, from wasted or underutilized products, such as molasses, or even flare gas. Ethanol is the least toxic of liquid or gaseous fuels. Methanol's toxicity can be managed. Both alcohols are denatured with a bitter agent, color and odor. Today, ethanol is produced for less than half to cost of kerosene and methanol for less than half the cost of ethanol.

The CleanCook Stove: Ideal Appliance



This stove is made by the Swedish company **Dometic AB**. We certify it to be Best Available Technology. It is known for safety, durability and power. It has a life of 10+ years. Available in one or two burners, the CleanCook uses a spill proof fuel canisters that hold 1.2 liters per filling, sufficient for a family's daily needs (4 ½ hours at full power). The stove rates at 65% efficiency and burns as hot as an LPG stove. It produces very low emissions and no soot. It is available to be manufactured by local business partners in African markets.

We have the Technology, we can create the Market.

Domestic markets for ethanol are the ideal markets. The highest value and best use of domestically produced ethanol is not for export; it is for cooking fuel for quality, high performing stoves. Export of ethanol is costly. Only the largest producers can command the best prices. Ethanol for cooking (and other appliances) also has many advantages over fuel blending. Blending with gasoline is technically challenging and the ethanol must be dried. The infrastructure costs are high. In contrast, stoves are easily placed in the market. They run best on hydrous ethanol and can even run with higher water content. Auto engines must be new and high compression to burn ethanol blends cleanly and efficiently. The market for cooking fuel is many times larger than for all other potential uses, including fuel blending.

Our Projects and Studies



A Nigerian woman in her kitchen cooking a meal on the CleanCook stove



Young girl in Salinas, Minas Gerais State, Brazil. Her mother lets her use the CleanCook because it is so safe.

Ethiopia Projects: In 2004, the government-owned **Finchaa Sugar Factory** invited Project Gaia to introduce CleanCook stoves and create a household ethanol market. Ethiopia currently produces 8 million liters of ethanol annually and there are plans for a massive expansion to 130 million liters by 2012. Stove fuel will be the largest market for this ethanol.

Ethanol stoves in displaced communities: In 2005 the Ethiopian NGO **Gaia Association** was formed to scale-up ethanol stoves in UNHCR-run refugee camps under the supervision of the Federal Government's Authority of Refugee Affairs. Before the CleanCook, women would walk up to 8 hours to find firewood. The once-wooded areas around the camps are almost barren; local communities struggle to safeguard what trees they have left. CleanCook stoves are now being used by 3,400 Somali families in the **Kebribeyah** and **Teferi Ber** camps and firewood collection has ceased. The stove is the most prized possession of the family.

Commercialization in Addis Ababa: Gaia is working with a private partner, **Makobu Enterprises PLC**, to commercialize and manufacture the stove in Ethiopia. Carbon credits will help make stoves cheap and affordable to low-income families.

Award Winning: The Ethiopian projects are Energy Globe and Ashden Award winners.

Nigeria Project: Pollution from gas flaring affects the air, water, soils, vegetation and even the physical structures all across the Niger Delta. Despite the area's great oil and gas wealth, most people cook with wood, or else dirty, dangerous kerosene, known as "killer kerosene," used in cheap wick stoves. **HydroChem Linde**, Gaia's technical partner, has developed a small-scale gas-to-methanol plant. Methanol is made cheaply from gas and the plant is simple, reliable and affordable. To stimulate demand for methanol, Project Gaia has introduced the CleanCook stove to Nigeria. A pilot study in 2007 in Delta State showed that households strongly prefer the CleanCook to kerosene stoves. Since ethanol is also being developed in Nigeria, Gaia is working with the **NEPAD Pan-Africa Cassava Initiative** to create a market for ethanol from cassava.

Brazil Pilot Studies: In 2006-7, the CleanCook stove was tested in urban and rural households in Minas Gerais State, Brazil, where ethanol is plentiful. Study families included small-scale cane growers and families of workers at the Jatiboca sugar mill. After 6 months of weekly monitoring by the Gaia team, the communities reported that the CleanCook was easy to use, handle, and clean, cooked faster than their LP gas stove and was much safer.

- ✓ Families reported saving an average of 30 minutes cooking time each day
- ✓ The stove felt safe, particularly for those with children
- ✓ Fuel could be bought in small, daily quantities – important for low income households
- ✓ Wood use is banned in some areas. Households valued the stove because the ethanol was coming from the local community and would be less likely to increase in price.

Project Gaia is looking for partners:

- Ethanol manufacturers interested in building a new and bigger market
- Capable partners to fabricate a quality stove & build a stove and fuel supply business
- Developers interested in producing alcohol fuels from wasted or under utilized resources.

Brazilian Microdistillery Model:

Community-owned and operated micro distilleries can be used to supply fuel in rural areas. Very small, efficient units can produce a few hundred or a few thousand liters/day. A unit can be operated by a single farm family or group of families and represents a modest capital investment. By linking microdistilleries with stoves, a dependable market for the ethanol is provided, and a reliable supply of fuel for the stoves. No middleman is needed. We work with **USI (Usinas Sociais Inteligentes)** which has developed advanced micro distillery technology.

Other Projects Worldwide: Project Gaia has conducted studies in South Africa and Malawi. Currently, PG is investigating alcohol markets throughout Africa. Project Gaia is interested in associating with partners who embrace our mission of developing clean, safe alcohol fuel for cooking and other household energy uses so that ample provision of food, clean water, shelter *and energy* for African families can be achieved.

