

Alcohol Microdistillery



A model for a community-owned and -operated microdistillery to fuel cooking stoves in rural areas

Alcohol Microdistilleries

- Small production units with the capacity to produce up to 5000 liters/day;
- A small unit could be operated by a single farming family alongside other typical tasks, e.g. caring for animals, managing crops, etc;
- Easy to operate.



Objectives

- To reduce/eliminate indoor air pollution resulting from the use of traditional fuels for cooking by replacing them with an alcohol-fueled cookstove;
- To generate income in communities by producing alcohol at the local level;
- To diminish rural flight to urban areas by providing an activity that is easy to manage and economical;
- To allocate other uses for alcohol, e.g. lighting, vehicles, farm machinery, etc;
- To provide local government, taxi drivers associations, business and even families, fuel for its fleet of flex fuel cars.
- To promote sustainable development by using the by-products of alcohol production.
- To establish carbon credits as income-generation

The Production Process

1. Milling of the sugar cane to extract the juice;
2. Filtering the sugarcane juice;
3. Fermentation of the juice in the tanks to produce sugar cane wine with alcohol;
4. Distillation of the wine to separate the ethanol from the vinasse.



Sugarcane Mill



Filtration and dilution of the sugarcane soup



Distillation tower

Utilizing the By-products

- Tip of the sugarcane plant can be used to feed cattle;
- Sugarcane bagasse can be used to fire the boiler or to feed cattle;
- Vinasse can be used to feed cattle or can be used to fertilize the fields;
- The water used in the cooling process is totally recycled.

Necessary Equipment

- 1 mill to extract the sugarcane juice;
- 1 diluting tank to standardize the juice;
- 1 aerometer to measure the sugar content;
- 1-2 lined tanks for fermentation process;
- 1 stainless steel distillation column;
- 1 stainless steel rectification column;
- 1 boiler of 300 kg vapor/hour;
- Depending if you choose to produce cachaça (hard rum), rapadura (sweet candy) or sugar, other equipment will be necessary.

Model 1—A Smaller Microdistillery



Ponte Nova, Minas Gerais, Brazil. This unit does not have a **boiler**, it utilizes furnaces.

- In the mold of large distilleries with centralized production, the entire production process occurs in one local unit.

Model II – Rectifying Plant

- Several units located in various communities near the sugarcane growing areas where pre-distillation occurs, and the pre-distillate is then brought to a central distillation plant for the final distillation process to raise the alcohol content.



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Modelo III – Integrated Production of cachaça/raw sugar and Alcohol

- Production of alcohol alongside the production of cachaça (hard rum that is the traditional drink of Brazil), or raw sugar.



Cachaça producer of Salinas, Minas Gerais, where the residue of cachaça production is sent to the distillation tower to produce alcohol.

Estimated Costs

- Planting 1 hectare of sugarcane—
US\$ 1300.00
- Complete unit producing 200 liters/day—
US\$ 40,000.00
- Complete Unit producing 500 liters/day—
US\$ 70,000.00
- * These values do not include maintenance and transportation costs.

Labor Associated with Alcohol Production in a Microdistillery

Micro distilleries to produce between 150-200 liters/day, are operated by 2 to 3 people (usually from the family) getting paid minimum wage (which is good for rural workers), so the cost per liter of alcohol is about US\$ 0.35.

The following activities are necessary:

- Planted area – 3.5 to 5 hectares
- Duration of the planting/harvest – 200 days/year.
- Harvesting and transportation: 4 hours/day (daily process of 1-2 tons of sugarcane usually transported by ox car)
- Distance between planted area and the distillery – 1.5 km.
- Milling: 3 hours/day
- After milling, the juice is placed in the fermentation tanks, which takes about 18-22 hours to ferment it, then the distillation process begins.
- Distillation: about 6.5 hours/day
- Daily production (60-150 liters) of alcohol.