

CHARCOAL PRODUCTION IN TANZANIA

Wood waste

- During sawmilling different kinds of wood waste are produced: offcuts, bark, sawdust, wood chips and paper mill residues. Of these, offcuts, wood chips and sawdust are produced during primary sawmill production.
- The recovery rate of Tanzanian sawmills is fairly low, meaning that the sawmills produce large amounts of wood waste as side product. Depending on the utilization rate of raw material, the amount of wood waste ranges between sawmills from 60 to 75%. This means that there is a great reserve of vastly underused and underrated resource of raw material.
- While offcuts can be used as building material, wood chips and sawdust are mostly either burned or left abandoned at the site. This creates an ever increasing problem of unmanaged burning that can spread and cause large wild fires, destroying forests and settlements, or wasteland that requires decades to disintegrate wood waste.
- The best uses for sawdust and wood chips are in charcoal production or in livestock keeping.



Wood charcoal and briquetting production facts

- As the ban for harvesting trees solely for charcoal producing purposes is spreading across Tanzania, major opportunities are arising in producing charcoal from wood waste.
- At the same time producing charcoal and briquettes from wood waste will eliminate an ever increasing problem of waste management. In many cases wood waste is either burned or left on site.
- Better option for safety and health in the kitchen that does not create sparks and reduces exhaust fumes (charcoal burns cleanly compared to firewood).
- Environmentally friendly option, because no forest is cut down to produce charcoal. As the production uses already available material, it reduces harvest of natural forests.
- Charcoal production has cheap or free raw material that is readily available.
- Additional benefits are low production costs and low required technical skills.
- In addition to charcoal manufacturing, several different production possibilities for briquette making exist. Of these, three are common in Tanzania and presented below along charcoal.



Charcoal production

Required machinery	Kiln (200 l)
Machinery availability	Domestic
Maintenance	None required unless breakage
Number of labourers/operators	2 general labourers
Raw material(s)	Wood waste (any type of hard or soft wood)
Type of products	Charcoal
Heat production	30 MJ/kg
Maximum production per day	Depends on the kiln (200 l kiln produces 10kgs/h = 70 kgs/day for 8 h shift)
Investment cost	For 200 l kiln: 100,000 TSH
Labour cost (per month, other operational costs not included)	400,000 TSH (labour estimated as 10,000 TSH per day)
Maintenance cost	0 TSH/month
Expected income per month (production cost not deducted)	1,112,000 TSH (with 200 l kiln working 5 days per week = 20 d/month)



Briquette production: type 1 (small scale production)

Required machinery	Kiln (200 l), extruder (modified meat mincer) and tarpaulin (10x10m, for air drying)
Machinery availability	Domestic available
Maintenance	None required unless breakage
Number of labourers/operators	3 labourers (1 for each machine)
Raw material(s)	Any combustible biomass, binder (for example clay, cassava starch, tar, molasses, wax) and water
Type of products	Briquettes (see picture below)
Heat production	14-16 MJ/kgs (depending on the binding material)
Maximum production per day	30 kgs/day (for 8 h shift)
Investment cost	Kiln: 50,000 TSH Extruder: 50,000 TSH Tarpaulin: 60,000 TSH
Labour cost (per month, other operational costs not included)	600,000 TSH (labour estimated as 10,000 TSH per day)
Maintenance cost	0 TSH/month
Expected income per month (production cost not deducted)	450,000 TSH (with 5 day working week = 20 d/month)



Briquette production: type 2 (medium scale production)

Required machinery	Dryer, carbonizer, extruder and tarpaulin (20x20m)
Machinery availability	Foreign and domestic (depending on the machine)
Maintenance	Required weekly, available domestically
Number of labourers/operators	8 labourers/operators, of which: 4 operators for the dryer 2 each for the carbonizer 2 for the extruder
Raw material(s)	Sawdust, binder, lime and water
Type of products	Briquettes (see picture below)
Heat production	14-16 MJ/kgs (depending on the binding material)
Maximum production per day	400-2400 kgs/day (50-300 kgs per h depending on the extruder, 8 h shift)
Investment cost	Dryer: 5,500,000 TSH Kiln: 220,000 TSH Extruder: 5,500,000 TSH Tarpaulin: 100,000 TSH
Labour cost (per month, other operational costs not included)	1,800,000 TSH (labour estimated as 10-15,000 TSH per day, depending on duty)
Maintenance cost	200,000 TSH/month
Expected income per month (production cost not deducted)	8-48 million TSH (with 5 day working week = 20 d/month)



Briquette production: type 3 (big scale production)

Required machinery	Screen, sawdust dryer, pyrolyzer, cooler, mixer, extruder, briquetting dryer and packaging machine
Machinery availability	Foreign and domestic (depending on the machine)
Maintenance	Required weekly, available domestically
Number of labourers/operators	25 labourers/operators, of which: 2 for screen 4 for the sawdust dryer 5 for the pyrolyzer 1 for the cooler (if separate from the pyrolyzer) 6 for the extruder 4 for the briquetting dryer 3 for packaging
Raw material(s)	Sawdust, binder, lime and water
Type of products	Briquettes, wood tar, wood vinegar and synthetic gas
Heat production	14-16 MJ/kgs (depending on the binding material)
Maximum production per day	2000 kgs/day
Investment cost	Screen: 1 mill TSH Sawdust dryer: 2.2 mill TSH Pyrolyzer (10 m length): 44 mill TSH Cooler (separate from pyrolyzer): 1.5 mill TSH Extruder (4 pcs): 22 mill TSH Briquetting dryer: 2.2, mill TSH Packaging machine: 5 mill TSH
Labour cost (per month, other operational costs not included)	15 mill TSH (estimated labour)
Maintenance cost	2 mill TSH/month
Expected income per month (production cost not deducted)	60-80 mill TSH (with 7 day working week in 3 shifts)



Considerations before starting charcoal production

- Evaluation of available markets
- Competition and synergy benefits from other operators
- Deciding on the raw material, technology and production process
- Logistics for entering markets
- Cost-profit analysis

Services related to charcoal production at FWITC

- Demonstration services for stakeholders
- Advisory services for stakeholders
- Training SME owners, managers and operators on charcoal production

Contact and how to get there

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Driving instructions: Junction of CF Madibira Rd., drive straight about 1,5 km. The junction to FWITC is opposite to the briquetting factory, on the left side of the road.

About the Private Forestry Programme (PFP)

The Private Forestry Programme (PFP) supports private forest ownership, particularly the establishment and management of plantations by smallholders, as well as the wood industry and the development of mature timber markets that would benefit all stakeholders. The programme operates in four regions: Iringa, Njombe, Morogoro and Ruvuma.

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