**TLUD (top-lit, up-draft) Pyrolyzer**: TLUD gasifiers automatically make char while producing combustible energy. A TLUD is basically a canister filled with biomass to create a “fuel bed”.  TLUDs are either batch-fed or continuously-fed, biomass gasifiers that are loaded with a feedstock (biomass in the form of wood chips, pellets, briquettes, etc.).  Air enters the canister through holes in a grate at the bottom of the cylinder.  The fuel bed is ignited on top, burning some of the volatile gases to generate the heat needed to gasify un-pyrolyzed feedstock.  The ignition front travels down through the fuel by heat radiating into the raw fuel, which dries it and initiates thermochemical conversion of the feedstock into char and wood-gas. The "ignition front" is actually a pyrolysis reaction within the canister that moves through the feedstock, in what is called a "Migratory Pyrolytic Front" (MPF).  The ignition front is maintained by air (i.e., primary air) that enters the bottom of the cylinder.  Residual char is left on top of the fuel bed as the MPF moves downward. The MPF creates a draft for primary air, which can be also supplemented and controlled by forced air pushed inward from fans. When the MPF reaches the bottom of the cylinder, the smoke-producing reaction is complete, and pyrolysis ends.  At this point the char is removed from the cylinder.  If the char is not removed, it may burn slowly from the bottom up unless the fire is snuffed out by the lack of oxygen. During pyrolysis, volatile gasses in the form of white smoke (wood-gas) dissipate upwards into a secondary combustion chamber where it is consumed to produce heat and carbon dioxide (mostly). The gas flame in the secondary chamber is supported by air (secondary air) entering through side-holes or a gap near the top of the cylinder. The primary and secondary air can move by natural draft, relying on the buoyancy of hot gasses to push air through the system, or draft air can be forced – and controlled – by using a variable-speed, small electric fan to push the air.  The pyrolysis leaves behind char rather than ash for two reasons: (1) as the  MPF moves downwards, it thermochemically transforms new fuel at a rate faster than oxygen is supplied to combust it, and (2) pyrolysis and the combustion of volatiles can occur much faster than the combustion of char, which requires a higher level of activation energy.[[1]](#footnote-1)1  Continuously-fed TLUDs use augers to maintain the MPF in a stationary position by supplying new feedstock into the bottom of the cylinder while removing char through an upward port into a quenching container that extinguishes any reactions, cools the char and stores it.

1. 1Julien. P. Winter (2015) <http://www.biochar-bangladesh.org/technology_tlud/> (Download date: Dec 6, 2017). [↑](#footnote-ref-1)