



Wood Waste and Anaerobic Digestion

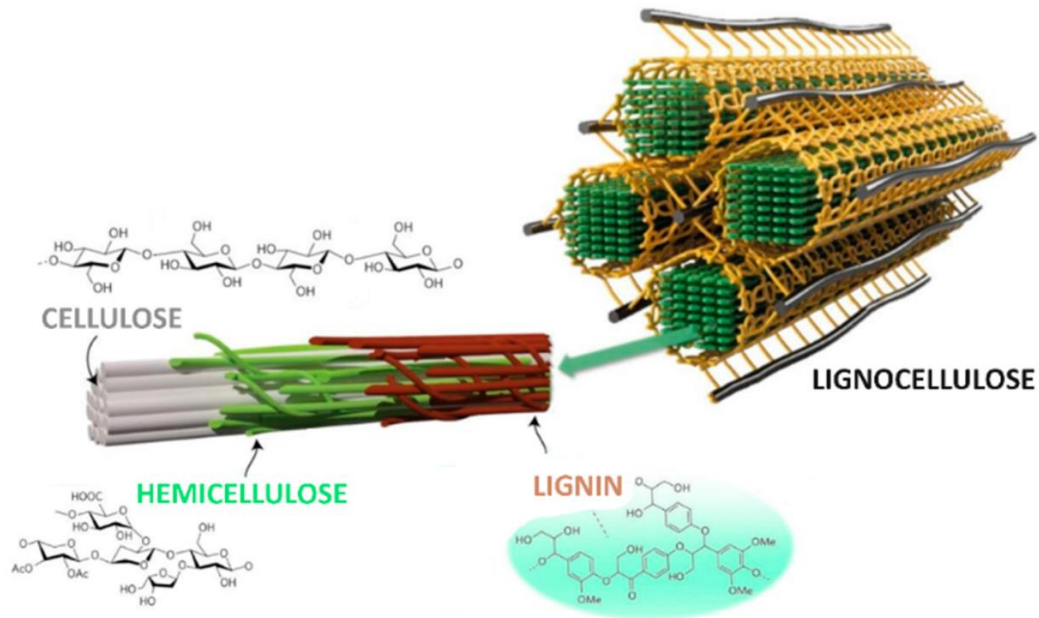
According to the U.S. EPA - forestry and logging is part of the Agricultural sector (NAICS 113). So is waste from forestry and logging activity (further in the text – agricultural waste or AW). Thermochemical methods (such as VRG HTAP pyrolysis) and biochemical methods (such as anaerobic or aerobic digestion) are the primarily available methods for value added products recovery from AW.

Anaerobic digestion is the process of microbial organic material degradation in the absence of oxygen producing methane and carbon dioxide. Anaerobic digestion is the process of microbial organic material degradation in an oxygen-rich environment producing carbon dioxide and water. VRG HTAP pyrolysis is the process of thermal degradation of organic material at high temperature in an atmosphere without forced addition of oxygen producing a mixture of fuel gases – methane, hydrogen, carbon monoxide and biochar.

The possibility and ability to recover products from AW applying a particular method, depends on AW properties. Agricultural waste is represented by two major sources:

- (1) generated from vegetation crops: husk, hull, straw, stalk, branch, trunk, root.
- (2) livestock AW is generated from animals: manure, dung, fat, slurry.

Vegetation crops are also called lignocellulosic because they consist mainly of cellulose, hemicellulose, lignin and small amounts of minerals (ash). Lignin is an organic polymeric material that forms crop cell walls and make them rigid, resistant to chemical and microbial degradation.



According to a wide range of studies on the degradability of lignocellulosic waste – lignin is not metabolized by anaerobic bacteria. Because wood fibers are covered by lignite, it makes it very difficult for anaerobic digestion to process wood. Without preliminary treatment the anaerobic digestion process can achieve on average 10% degradation of wood organic material with only 5% of carbon in wood converted to methane.

Livestock animals that consume crops are playing the role of biological pretreatment reactors and make cellulose and hemicellulose available for anaerobic bacteria when treated as part of manure recovery. Even in this case anaerobic digestion allows for the conversion on average 60% of livestock organic material into biogas, the rest is left in digestate.

VRG's HTAP thermochemical process will apply heat energy to the wood waste to break lignocellulosic fiber structures and extract volatiles in the form of a fuel gases mixture allowing recovery of 85% of organic material on average.