Assessment of the energy utilization of industrial residual wood in the context of isolated geographical regions.

Yesid Aguilar Lemus, EST. PhD, UPV UNIVERSIDAD, ESPAÑA

Abstract

It was assessed the use of the residual biomass coming from logging as a source for generation of energy. To do so, it was carried out a study of localization, quantification and physico-chemical characterization of this residual biomass. The process of localization and sampling was developed on the basis of the implementation of a statistical methodology, which allowed to reliably assure a production of 1177 Ton/year of residual biomass, in a heterogeneous exploitation process in biomass species and their production methods. The hypothetical consideration of a technological setting for a thermochemical utilization of the residual biomass for energy purposes, in combination with a Life Cycle Assessment (LCA), allowed to determine a capability of sustainable energy coverage of 1126 dwellings in the city of Quibdó. This city has infrastructure and social characteristics in common with many regions of Colombia and the planet.

Representative samples of the 5 species selected were reduced in size in order to characterize them. The results of the physico-chemical characterization and the representation of the 6 samples in the Van Krevelen diagram (Figure 1), prove that cedar is the wood waste with the highest energy potential (Greater HHV), this is due to the fact that the smaller the atomic ratios H:C and O:C are, the greater the energy content is [1]. The energy exploitation of cedar is the most promising since it exhibits the lowest value of the FC/VM ratio.

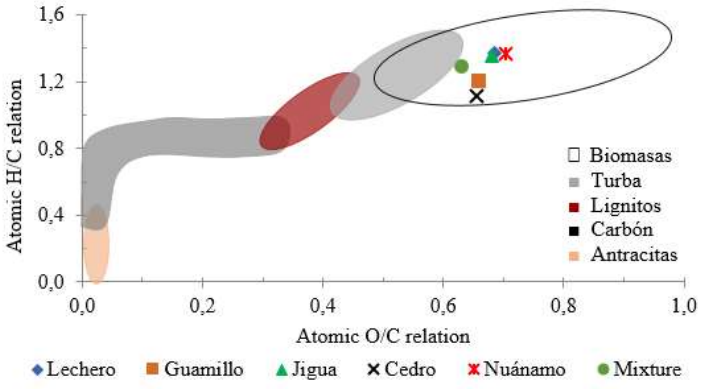


Figure 1. Placement of the samples studied in the Van Krevelen Diagram

The samples of the wood wastes referred to as Guamillo and Mixture, are the next in importance regarding the energy density according to the Figure 1. The location in the Van Krevelen Diagram of the Nuánamo sample represents greater atomic ratios of H:C and O:C, which along with its low content of residual moisture allow to infer that during a thermochemical transformation process, it will show a good reactive performance followed by the Cow Tree and Jigua respectively.

All the wood wastes analyzed present low ash content, which makes them more desirable as fuels; furthermore, that has the benefit of a higher quality of the products, since this fact increases the calorific value, facilitates the biochemical and thermochemical conversion, decreases the corrosivity and avoids abrasions and incrustations in boilers and other pieces of equipment of thermochemical transformation, especially when the ash has high content of alkaline oxides and salts, which produces eutectic mixture with a low melting point [2-6].

Recent Publications

1. Singh YD, Mahanta P, Bora U. Comprehensive characterization of lignocellulosic biomass through proximate, ultimate and compositional analysis for bioenergy production. Renew Energy 2017;103:490–500. doi:10.1016/j.renene.2016.11.039.
2. McKendry P. Energy production from biomass (part 3): Gasification technologies. Bioresour Technol 2002;83:55–63. doi:10.1016/S0960-8524(01)00120-1.
3. Lam PS, Sokhansanj S. Engineering Properties of Biomass. Eng. Sci. Biomass Feedstock Prod. Provis., 2014, p. 17–34.
4. Kenney KL, Smith WA, Gresham GL, Westover TL. Understanding biomass feedstock variability. Biofuels 2013;4:111–27. doi:10.4155/bfs.12.83.
5. Vassilev S V., Vassileva CG, Song YC, Li WY, Feng J. Ash contents and ash-forming elements of biomass and their significance for solid biofuel combustion. Fuel 2017;208:377–409. doi:10.1016/j.fuel.2017.07.036.
6. Nunes LJR, Matias JCO, Catalão JPS. Biomass combustion systems: A review on the physical and chemical properties of the ashes. Renew Sustain Energy Rev 2016;53:235–42. doi:10.1016/j.rser.2015.08.053.



Biography

Yesid Aguilar Lemus, has his greatest experience in the Use and Valuation of Solid Waste in order to generate new products. He is currently working on the evaluation of sawdust waste for the generation of clean energy, given the need of the black population of western Latin America, especially Colombia.

Email: yeal76@yahoo.es

Presenting author details
Full name: YESID AGUILAR LEMUS
Contact number: (+57) 3103224778
Mail id: yeal76@yahoo.es
Category: (Poster presentation)