

# **The energy potential of agriculture, agroindustrial, livestock, and slaughterhouse biomass wastes through direct combustion and anaerobic digestion. The case of Colombia**

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## **Abstract**

In Colombia, agriculture and livestock production, and the processing agroindustry (including slaughterhouses) are a significant source of biomass wastes, which often generate significant environmental impacts. Waste-to-energy technologies, particularly direct combustion and anaerobic digestion systems are an alternative to revalorize these wastes as energy sources while reducing their environmental impacts. To this end, is necessary to identify the biomass-based energy potential from the available biomass wastes. It is additionally necessary to highlight potential applications of the biomass-based energy potential, to replace unsustainable energy sources like fossil fuels or cooking wood in the end-use energy mix. To this end, an inventory of the main crops and livestock produced in Colombia, and the share processed in agroindustry was developed to identify the available biomass wastes for energy applications. Based on the inventory, the biomass-based energy potential was calculated for the use of direct combustion and anaerobic digestion systems. The results show a bioenergy potential of 60,000 to 120,000 GWh per year, with higher potentialities for direct combustion systems than for anaerobic digestion. In particular, the biogas potential account for 90% of the use of natural gas and LPG. Moreover, using around half of the solid biomass available in direct combustion systems can potentially replace the use of solid fuels (i.e. wood and coal). In total, the combined use of direct combustion and anaerobic digestion can support from 50 to 97% of the use of gaseous and solid fuels. Using combined heat and power systems for heat and electricity production can increase the biomass share in the end-use energy mix up to 15 to 28%, including 27 to 53% of the 68,943 GWh of electricity produced in 2018.

## **Keywords:**

Renewable energy, biomass, waste-to-energy, direct combustion, anaerobic digestion