

Analysis of Drought Impact on Sugarcane Bagasse Based Electricity Generation under Climate Change Scenarios

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The Rio dos Patos Basin in the Cerrado Biome in Brazil is experiencing land use change from (degraded) pasture to sugarcane fields. While the Cerrado has a low share of land under sugarcane cultivation (2 %), it contains half of Brazil's sugarcane area and presents the highest sugarcane expansion rate due to land availability, flat topography and climatological characteristics. Sugarcane in Brazil is a relevant crop for sugar and biofuel production and, nowadays increasingly, for electricity production. Electricity demand in Brazil is covered mostly by hydropower plants (65 %). However, during dry and low river discharge periods, thermal power plants (oil and natural gas) cover most of the gap (14 %). Some sugarcane mills had experience selling electricity surplus prior 2005, when the first auction to 'new energies' was held. Thereafter, electricity generation based on sugarcane bagasse covers 8 % of annual demand, mostly delivered during dry season. Recent unprecedented drought events in Brazil, showed the electricity production vulnerability to droughts. Drought risk assessments including weather trend analysis and climate change scenarios can help to identify regions at risk and help to point opportunities to better cope and adapt to future drought events. In this context, the potential of sugarcane bagasse based electricity generation was evaluated in the Rio dos Patos basin. Weather data from 36 stations within the area and downscaled climate change projections under RCP 4.5 showed a decrease on precipitation jeopardising water availability. Using the Soil & Water Assessment Tool (SWAT) two scenarios were modelled: 1) without sugarcane expansion and 2) with 45 % expansion to sugarcane suitable land. Drought impacts on sugarcane and electricity production will be discussed under the mentioned scenarios. Considering the biome susceptibility to similar drought events, it is important to consider different adaptation strategies for both, sugarcane crops and energy generation, towards energy and water security.

Keywords: Cerrados, climate change, drought risk, energy, sugarcane

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