Evaluation of Changes in the Rainfall Regimes in an Energy Matrix Primarily Dependent on Hydropower Plants

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The Brazilian energy matrix is composed mainly of hydroelectric power plants. The levels of the reservoirs these plants are directly dependent of the rainfall that is the main natural way of replacement. Nowadays the reduction in rainfall levels in Brazil are observed and this may increase in the coming years resulting in a probable change in the configuration of the Brazilian energy matrix, reducing the share of renewable sources to a situation of greater dependence on the energy importation derived from fossil fuels, which are the immediate primary sources of energy available. The vulnerability of electric potential generation from water resources has been in evidence due to the uncertainties of climatic origin, planning or the lack of it. Changes in rainfall regimes are multifactorial phenomena that are difficult to model. Therefore, in this paper the consequences and impacts of the hydrological potential alteration on the energy matrix of a particular Brazilian State, Minas Gerais, are investigated in the view point of gases emission that contribute to the greenhouse effect and the social reflexes of the scenarios modifications motivated by climate change. Moreover, the study intends to show the importance of the water-energy-emissions nexus for energy planning and decision-making in order to evaluate the best options for coping with adverse and potentially destabilizing conditions. The analyses have shown that the effect of climate change may require an increase the share of non-renewable sources in the energy matrix and this could increase the CO_2 emissions by 2030, compared with current levels.

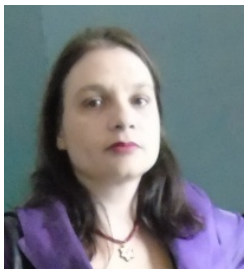
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