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Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Early insights on the fracking impacts to the water-energy nexus in Brazil: is there a risk of water scarcity in the shale gas prospective areas?

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ARTICLE INFO

Handling Editor: Mingshou Jin

Keywords:

Water-energy nexus
Shale gas
Fracking
Risk of water scarcity
Brazil

ABSTRACT

Brazil has the 10th largest shale gas reservoir, and the Paraná sedimentary basin has a potential area for shale gas production in the western portion of the São Paulo state. Despite that, the knowledge about the impacts of fracking on the local water resources is still limited. This study presents a novel reproducible method to compute the risk of water scarcity in areas with restricted or no shale gas development. Using geospatial numerical simulations under five scenarios from 500 to 2500 wells, we find that the fracking-related risk of water scarcity in the São Paulo state is low. For the 2013–2019 period, the long-term average seasonal water availability is between 0.05 and 1 Gm³ per water resources management unit, whereas fracking water demand would hardly overcome 6 Mm³ y⁻¹. For instance, with 2500 wells, the fracking demand in Pontal do Paranapanema, the most prospective region for shale gas, would not overcome 3% of the yearly local water demand. The riskier areas are in Aguapeí and Baixo do Tietê water resources management units, during winter and autumn, and the most water-stressed area is São José dos Dourados. In regions and periods of low water availability, fracking operators can use adaptative strategies for shale gas production. In the context of imminent droughts, this research debates national energy security and casts doubt on the water efficiency and sustainability of the state's energy generation. At last, this research provides early insights to support shale gas and water policy, and future studies to further investigate relevant aspects to the Brazilian Water-Energy nexus.