

## Proposed Abstract

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### **The “Ecopontes”: Small Multipurpose Dam-Bridge in Amazon using Multiple Axial-Flow Turbines**

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Despite the great action of the Luz para Todos program (2003), relaunched in 2023, there are still around one million people without access to electricity in the Amazon today. On the other hand, the rural electricity grid, which is largely made up of one-phase with ground return type, does not allow the implementation of small efficient production systems, either due to the lack of equipment equipped with single-phase motors, or due the poor quality of the energy provided, or due to the high cost of energy. In the Amazon rural, the municipal road network crosses several small watercourses, with access restricted to small wooden bridges. This study addresses the application of very and ultra-low head micro hydro power (MHP) installations in the Amazon, focusing on the integration of multiple axial-flow turbines under small bridges, particularly as these structures are in transition from wood to concrete. This involves analyzing flow duration curves and key curves upstream and downstream to design a MHP with two or more units to obtain the maximum annual energy generation. The study also evaluates the validity of the minimum pressure coefficient criterion to enhance the efficiency of very and ultra-low head hydro turbines. First, this criterion design is compared to an existing experimental study in the literature with a propeller turbine built with simple curved plate blade. The methodology is applied to a study case in a small bridge in Vila do Janari, at the southeast of State of Para, with head varying to 1,4 to 2,4 m and flow rate from 0,23 to 0,92 m<sup>3</sup>/s. The best configuration is capable to produces 50 MWh/year.