# Local, institutional and logistical challenges of installing *off-grid* renewable energy systems in isolated communities in the Amazon – an initiative at Resex Tapajós-Arapiuns

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## Overview

Approximately 760 thousand people in the Brazilian Amazon live without access to electric energy (EPE, 2023), because they are in spots not connected to the network used by the concessionaires to distribute electricity. According to EPE (2023), most of these so-called “isolated systems" are supplied with diesel oil fueled generators (58,3%). However, in the very remote villages, diesel and gasoline are expensive and difficult to acquire. Co-designing a clean energy supply system with them poses a multifaceted task, but, more than the supply side, to keep these systems running for a long time is an even greater challenge, since a large number of projects do not succeed due to issues related to their maintenance. In this paper, we present the primary field initiatives and results of the group in charge of the project “Convergence for Innovative Energy Solutions – Empowering Off-Grid Communities with Sustainable Energy Technologies" in four communities inserted in a protected area in the Brazilian Amazon. In two of them, after discussing with the residents about the best way to address their electricity needs through workshops, meetings and questionnaires, we installed micro-systems of generation and distribution of electricity (MIGDIs): a hydrokinetic turbine and two micro solar PV plants that supply all the houses and common spots for four hours a day (one hour more than they had using diesel oil generators). We executed the installations alongside with them and, regarding the hydrokinetic turbine, we followed their suggestions about the best spot to place it, after monitoring and measuring the speed of the river for about one year, in three different spots. Before installing the systems, we offered training sessions on basic knowledge of solar PV systems and, after the installations, we offered training sessions on community management of electricity generation systems. Besides, we discussed with the community every step of the design of their systems, that must be managed collectively by the community members.

## Methods

Portrayal of the activities carried out in the field, review of the available literature and the regulation framework for power suppling in remote systems, access to fieldwork reports, assessment of the questionnaires carried out with residents of the communities involved and interviews with representatives of partner institutions.

## Results

The MIGDIs aren’t the usual choice to power tiny communities because they are not considered feasible in a context where the federal programs of universalization of electricity, mostly financed by the government, are operated by concessionaires. The usual choice are the individual electricity generation systems (SIGFIs). *We suspect that it happens not due to the financial costs of the MIGDIs* (that are actually usually lower than the costs of the SIGFIs)*, but because of the costs that regard the organization of the communities*. In the case of the SIGFIs, the good practices of usage of the system are in charge of one

unique owner. In the case of the MIGDIs, the whole community is in charge. Besides, the concessionaire does not have the attribution to deal with socio communitarian issues. They have only to install the system (a system that does not mean profits, but costs for the company, although most of the funds used for this is public money).

## Conclusions

The longevity of the MIGDIs implies a certain community organization to guarantee their maintenance over time. And it's well known that the concessionaries have no hurry to fix technical problems in remote regions, due to the costs and the logistics. The more organized people are, the better they will claim for their rights when it comes to calling the concessionaire to action whenever maintenance or technical assistance is needed.