

## Analysis of an off-grid microgrid project for electrification in Namibia with Hardware in the loop (HIL) simulation.



At present around 35 % of Namibians (around 1 million) have no access to electricity and the rest of the population suffers from energy poverty. Major share of electricity comes from petroleum, season dependent hydro- power, imported coal and imported electricity from South Africa, Zambia and Mozambique making Namibia vulnerable in terms of self-sufficiency. Namibia has a copious potential for solar, wind and biomass generation which has to be exploited, off-grid microgrids are a great solution to harness the local renewable resources.

A careful assessment is necessary for planning the microgrids, which can be tested using a faithful hardware-in the-loop simulator. The idea of this thesis is to develop a rural microgrid in Namibia utilizing typhoon HIL. Raspberry pi/ myRIO is to be used as hardware controller and programmed as agents (variable loads/ renewable generators). The controllers will be integrated to the simulation model of Typhoon HIL and Energy Management is implemented within the simulation model utilizing python libraries.

### Your tasks:

1. Creating an example model for a subject village in Namibia.
2. Analyzing different renewable energy generation scenarios.
3. Modelling an AC microgrid on Typhoon-HIL for the subject case and developing a simple Energy management system for the case using simple stochastic optimization.
4. A simple economic assessment for payback period and environmental analysis for scenarios with different shares of renewable generation.

### What you bring:

1. Innate desire to help uplift the under privileged communities.
2. Good written and spoken English knowledge.
3. Experience with python, optimization is an advantage.
4. Desire to learn Typhoon-HIL.

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