This project aims to introduce a solution to Sudan's inadequate electricity supply; focusing specifically on current unconnected electricity grid users and the high cost of connecting rural regions to Sudan's national grid. We introduce Microgrids as a viable option to create new distributed grids that depend solely on renewable energy to generate sufficient electricity. We also aim to forward the usability of Microgrids by introducing a Machine learning technique to their secondary control that uses energy trading to ensure all loads in islanded Microgrids were secured using Reinforcement learning as the control for the trading procedure. We created a simulation for an islanded Microgrid, explored its design, output from each generation element and, the load profile at the loads. We then extracted data from the simulation and enhanced the design of the Reinforcement learning environment. We designed and implemented a generic environment for microgrids to be used in Reinforcement learning applications. We also implemented a set of rules for trading that can be used by Reinforcement Learning agents across three Microgrids, one primary and two acting as trading game players. Two deep Reinforcement learning algorithms were explored as a solution, the first was an on-policy algorithm, Proximal Policy Optimization (PPO), and the other was an off-policy algorithm, Deep Deterministic Policy Gradients (DDPG). We compared the results of applying both algorithms at three villages in Northern Kordufan State, Hamza ELsheikh, Tannah, and Um Bader. The algorithms achieved grid equilibrium without any grid loss and achieved profit from the trading process, reducing the time of return for the initial cost of the Microgrid.