持続可能な電化のためのハイブリッド再生可能エネルギー源の技術経済モデリングと最適化

Form 3

Abstract

Title: Techno-economic modelling and optimization of hybrid renewable energy sources for sustainable electrification
(題目：持続可能な電化のためのハイブリッド再生可能エネルギー源の技術経済モデリングと最適化)

This thesis considers the optimization of various Distributed Energy Resources to supply reliable power to Microgrids in various case study regions. In Chapter 1 (one), an introduction is presented on the actual scenarios of the energy situations that are to be investigated. Chapter 2 (two) investigated an Islanded Complementary Power System of the Bo-Kenema power network. The addition of high efficiency turbines to the optimum scenario reduced the COE and NPC costs by 38.9% and 39.1% respectively, while increasing CO2 emissions by 49.9%. In chapter 3 (three), a decision-making exercise by the Government of Sierra Leone led to the optimum scenario being the most sustainable configuration. A multi-attribute decision making approach considering weight assignment used in Chapter 4 (four) resulted to an optimum configuration for electrifying Banana Island. By using different scheduling approaches, solar tracking systems and PV modules in Chapter 5 (five), the optimum configuration increased PV production by 28% which led to a huge reduction in costs.

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