



# Feasibility Study of Sustainable Energy to Power Wastewater Treatment Plants for Islands

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Every year a huge amount of wastewater is discharged directly into watercourse, contaminating rivers and oceans with toxic and harmful substances. The municipal sewage needs to be effectively treated and managed, with the end goal of reducing and eliminating public health hazards and minimizing the impact of wastewater on the watercourse and its environment. A proper wastewater treatment requires a vast amount of energy. The process is continuous and it involves operation of large, energy intensive equipment on 24 hour-a-day basis. The single biggest expense of operating municipal wastewater treatment plant comes from electric power use.

## The Project

This study presents the economic assessment and unit configuration for a hybrid renewable energy system designed to power wastewater treatment plants. Kailua facility, located on the island of Oahu, Hawaii serving a population of 80.000 and Hveragerði, located in the south of Iceland with a population of 2.300 were used as a case study.

## The Objectives

The objectives were to utilize wind, solar energy and the useful end product resulted from anaerobic digestion process on site, such as methane, for cogeneration (CHP) purpose. The hybrid renewable energy system unit in figure 1 includes a fuel cell, wind turbines, solar photovoltaics and battery banks.

## Conclusion

Electricity consumption data from the facilities was analyzed. Economical and technical evaluations were conducted for the hybrid system. The cost of project and the system unit

lifecycle costs and sizes were estimated. The study showed that renewable energy sources can fully and safely power the facilities.

The result suggested that it is economically viable to apply the hybrid system in Kailua. Compared with the current electric supply rate (0,29 \$/kWh), the hybrid system could reduce the tariff to 0,17 \$/kWh. On the other hand, the hybrid system alternative was not feasible for Hveragerði, as it costs 1,14 \$/kWh to generate electricity, compared to the current rate, 0,12 \$/kWh.

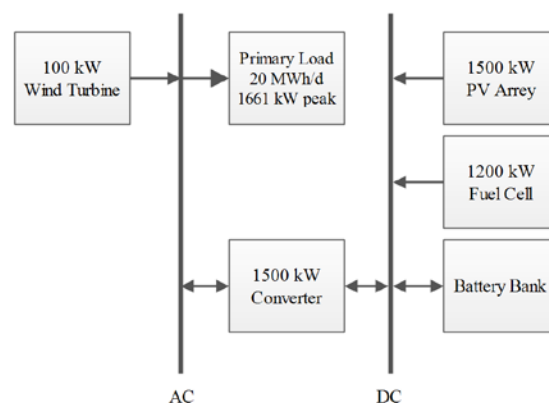


Figure 1 The hybrid renewable energy system designed to power the Kailua wastewater treatment plant