2. RENEWABLE ENERGY RESOURCES

Hydro

There is a dam located at Livadi area with the following features: Height: 32 m. Reservoir volume: 855,000 m³. Watershed area: 8 km². Mean annual inflow: 480,000 m³/yr (100 m³/s). According to Papakostas et al. (2017; this volume), a turbine of 8.08 MW is proposed on the existing dam to produce 25 MWh/y.

Marine

Overlapping Wave Energy Converters produce energy collecting the incoming waves through a system of wave-tune into the converter, and using the water to feed a low head turbine.

3.3. Towards an energy mix

Case 1. There is a geothermal field that supports a power of 0.5 MW.

Case 2. There is no geothermal field.

2.3. Adding controllable renewables

Controlled renewables (biomass, geothermal) are added to provide (a) installed power (2.6 MW) in order to satisfy the peak hourly deficit, (b) additional energy to cover the annual deficits (1–2 GWh) and (c) management of surplus energy (2–6 GWh).

A pumped-storage system, that uses sea water to store energy, is in operation and the installed power is 0.32 MW.

In this research the six renewable energy resources were examined to create the energy mix of a non-connected small island. The advantage of this method is that each renewable energy source is assessed in its own right and does not integrate with other energy sources. A major disadvantage is that the energy production of the non-connected small island (small island) is produced at a high cost and therefore is not feasible in comparison to the production of energy from the existing grid.

The energy system of the non-connected islets is realised through the following: (a) geothermal energy is proposed as the main source of energy; (b) wind energy is used as a backup source; (c) solar energy is used as a backup source; (d) wave energy is used as a backup source; (e) biomass energy is used as a backup source; (f) hydro energy is used as a backup source.

3.3. Towards an energy mix

Condition 5: The use of pumped-storage in a different way to store energy with 0.6 MW surplus from other energy sources. The existence of a reservoir also contributes to the satisfaction of peak deficits.

Condition 4: Theoretically, the energy demand of the island could be satisfied using only renewable resources, but financial, environmental and sociological factors must thoroughly be examined.