Thermal energy storage kiribati

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Interconnected geoscience is a concept advocating the application of excellent geoscience/engineering/technical work to international development that includes contextual conditions such as community, level of development, and local world views/wisdom. This diagram summarises the key ‘interconnected’ components of the Kiribati OTEC-seawater utilisation programme (adapted from Petterson [2]).

Geography of the Pacific Islands region. Note the archipelago nature of most PSIDS with islands scattered over large areas of ocean. AS, American Samoa; AU, Australia; CI, Cook Islands; FM, Federated States of Micronesia; FJ, Fiji; PF, French Polynesia; GU, Guam; KI, Kiribati; MH, Marshall Islands; NR, Nauru; NC, New Caledonia; NU, Niue; NZ, New Zealand; MP, Marianas Islands; PG, PNG; PN, Pitcairn; PW, Palau; WS, Samoa; SB, Solomon Islands; TK, Tokelau; TO, Tonga; TV, Tuvalu; VU, Vanuatu; WF, Wallis and Futuna.

The Pacific regions contain a wide geodiversity and present a range of ocean geological features, see text for details. Colour code: Deep blue/purple represents deepest ocean depths, pale blue represents shallower ocean, and browns and white/pale grey (within the ocean) represent topographic highs, the highest points of which form islands (acknowledgements to Google earth for the base topographic map).

Photograph of a remote island atoll from the Gilbert Group of Kiribati, Pacific Islands region. Atoll islands form annular rings of low-lying (<1–4m above sea level) made of sand, gravel and deeper igneous rock. An inner, shallower lagoon is separated from the deep ocean by the atoll islands (Photograph: Petterson).

Graph of GDP/head for Pacific Island countries and territories. GDP/head for Korea and the USA for reference. Note how the independent PSIDS have the lowest GDP/head values. Kiribati is highlighted (figures from SPC [15] and UN [16]).

Many atoll PSIDS have developed high-density concentration urban centres which attract populations from the outer islands. These islands are characterised by high densities of housing, many of which are traditional houses and some of lower-quality informal style. Examples of urbanised centres include Funafuti (Tuvalu), South Tarawa (Kiribati), and Ebeye/Majuro (Marshall Islands).

Typical traditional house in South Tarawa, Kiribati. Urban houses such as this comprise a thatched roof and cement lower part and floor. People may keep pigs close to the house if planning regulations permit. Note the sandy soils, tropical vegetation, and standing water (Photograph: Petterson).

The enchanting attractions of atoll islands (here North Tarawa, Kiribati) include the seamless change from land to ocean. Atoll islanders are equally at home on land and in the ocean and can spend much of their day working or enjoying recreation in the shallower waters that surround their low-lying islands (Photograph:

Petterson).

Graph of GDP/capita vs. electricity usage per capita. See text for details [23].

Installed electricity generation for selected Pacific Island countries (data, United Nations [22]). Note the logarithmic scale on the Y-axis.

Graph of installed electricity capacity per head versus GDP/head for selected Pacific Island countries. Note how Kiribati and Solomon Islands are the least energized countries and Fiji/Marshall Islands the most energized from this analysis.

Principles of OTEC. A working fluid (R32 within closed cycle OTEC plant such as on Kiribati) is vaporised, with the vapour turning a turbine to create electricity. The vapour is cooled from deeper seawater and then heated via heat exchanges to be vaporised once more. OTEC plants can also provide desalinated drinking water and waters for agriculture/aquaculture at downstream (acknowledgements Scientific American [25]).