

# 1 Power from the Ocean

It has been proposed to use the thermal gradient of the ocean to drive a heat engine. Suppose that at a certain location the water temperature is  $22^\circ\text{C}$  at the ocean surface and  $4^\circ\text{C}$  at the ocean floor.

- (a) What is the maximum possible efficiency of an engine operating between these two temperatures?
- (b) If the engine is to produce 1 GW of electrical power, what minimum volume of water must be processed every second? Note that the specific heat capacity of water  $c_p = 4.2 \text{ Jg}^{-1}\text{K}^{-1}$  and the density of water is  $1 \text{ g cm}^{-3}$ , and both are roughly constant over this temperature range.