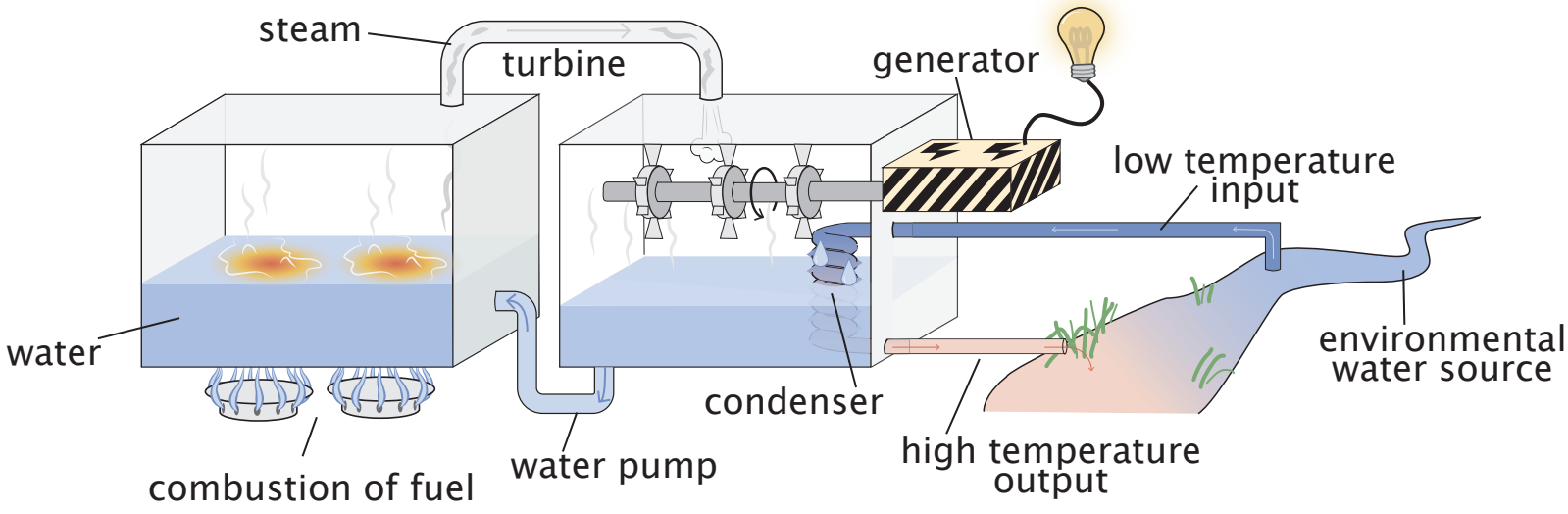
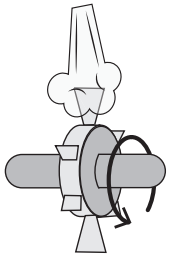
(A)

ELECTRICITY GENERATION BY BOILING WATER



(B)

ESTIMATING VAPORIZED WATER VOLUME



$E_{thermoelectric} \approx 10^{20}\ J / year$

$\Delta H_{vaporization} \approx f \times 10^{6}\ J / kg\ H_2O$

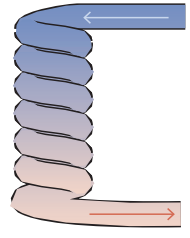
$\Phi_{energy\ transfer} \approx 70\%$

$$V_{H_2O}^{(vaporized)} \approx \frac{10^{20}\ J}{year} \times \frac{1\ kg}{f \times 10^{6}\ J} \times \frac{1}{0.7} \times \frac{1\ kg}{1\ L}$$

$$\approx 10^{14}\ L / year$$

(C)

ESTIMATING ONCE-THROUGH COOLANT VOLUME



$E_{thermoelectric} \approx 10^{20}\ J / year$

$\Phi_{energy\ transfer} \approx 70\%$

$$E_{steam} \approx \frac{10^{20}\ J}{year} \times \frac{1}{0.7} \approx 1.f \times 10^{20}\ J / year$$

$\Delta T \approx f\ °C$

$C_{H_2O} \approx \frac{f \times 10^{3}\ J}{°C \times kg}$ (specific heat of H_2O)

$$V_{H_2O}^{(cooling)} \approx \frac{1.f \times 10^{20}\ J}{year} \times \frac{°C \times kg}{f \times 10^{3}\ J} \times \frac{1}{f\ °C} \times \frac{1\ L}{1\ kg}$$

$$\approx 10^{16}\ L / year$$