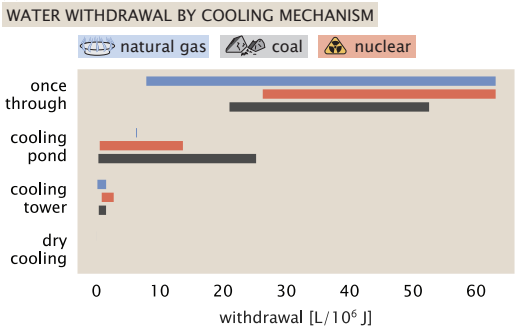
(A)




**once-through withdrawal**

$$E_{thermoelectric} \approx f \times 10^{19}\ J\ /\ year$$

$$\Phi_{once-through} \approx 30\%$$

$$w_{once-through} \approx \frac{f \times 10\ L}{10^6\ J}$$

$$V_{H_2O}^{(once-through)} \approx 0.3 \times \frac{f \times 10^{19}\ J}{year} \times \frac{f \times 10\ L}{10^6\ J}$$

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

**cooling tower & pond withdrawal**

$$E_{thermoelectric} \approx f \times 10^{19}\ J\ /\ year$$

$$\Phi_{other} \approx 70\%$$

$$w_{other} \approx \frac{10\ L}{10^6\ J}$$

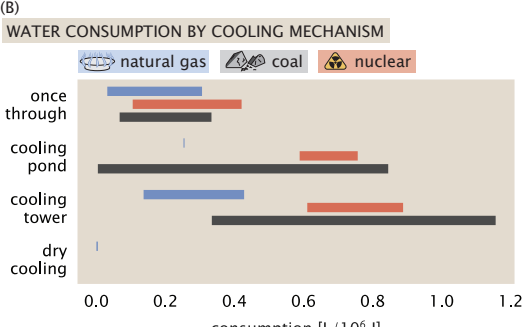
$$V_{H_2O}^{(other)} \approx 0.7 \times \frac{f \times 10^{19}\ J}{year} \times \frac{10\ L}{10^6\ J}$$

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

**total withdrawal volume**

$$V_{H_2O}^{(withdrawal)} \approx V_{H2O}^{(once-through)} + V_{H2O}^{(other)} \approx f \times 10^{14}\ L\ /\ year$$

(B)




**once-through consumption**

$$E_{thermoelectric} \approx f \times 10^{19}\ J\ /\ year$$

$$\Phi_{once-through} \approx 30\%$$

$$c_{once-through} \approx \frac{0.f\ L}{10^6\ J}$$

$$V_{H_2O}^{(once-through)} \approx 0.3 \times \frac{f \times 10^{19}\ J}{year} \times \frac{0.f\ L}{10^6\ J}$$

$$\approx 10^{12}\ L\ /\ year$$

**cooling tower & pond consumption**

$$E_{thermoelectric} \approx f \times 10^{19}\ J\ /\ year$$

$$\Phi_{other} \approx 70\%$$

$$c_{other} \approx \frac{0.5\ L}{10^6\ J}$$

$$V_{H_2O}^{(other)} \approx 0.7 \times \frac{f \times 10^{19}\ J}{year} \times \frac{0.5\ L}{10^6\ J}$$

$$\approx 10^{13}\ L\ /\ year$$

**total consumed volume**

$$V_{H_2O}^{(consumed)} \approx V_{H2O}^{(once-through)} + V_{H2O}^{(other)} \approx 10^{13}\ L\ /\ year$$