60. (a) The rate of heat production is

$$\begin{aligned}
\frac{dE}{dt} &= \sum_{i=1}^{3} R_i Q_i = \sum_{i=1}^{3} \lambda_1 N_i Q_i = \sum_{i=1}^{3} \left(\frac{\ln 2}{T_{1/2_i}}\right) \frac{(1.00\,\text{kg}) f_i}{m_i} Q_i \\
&= \frac{(1.00\,\text{kg})(\ln 2)(1.60\times 10^{-13}\,\text{J/MeV})}{(3.15\times 10^{7}\,\text{s/y})(1.661\times 10^{-27}\,\text{kg/u})} \left[\frac{(4\times 10^{-6})(51.7\,\text{MeV})}{(238\,\text{u})(4.47\times 10^{9}\,\text{y})}\right. \\
&\qquad \left. + \frac{(13\times 10^{-6})(42.7\,\text{MeV})}{(232\,\text{u})(1.41\times 10^{10}\,\text{y})} + \frac{(4\times 10^{-6})(1.31\,\text{MeV})}{(40\,\text{u})(1.28\times 10^{9}\,\text{y})}\right] \\
&= 1.0\times 10^{-9}\ \text{W}\ .
\end{aligned}$$

(b) The contribution to heating, due to radioactivity, is $P = (2.7\times 10^{22}\,\text{kg})(1.0\times 10^{-9}\,\text{W/kg}) = 2.7\times 10^{13}\,\text{W}$, which is very small compared to what is received from the Sun.