$$I = \frac{P}{A} \qquad SA_{sphere} = 4\pi R^2$$

$$P_{sun} = \text{huge} = 3.8\times10^{26}W$$

$$I_{sphere} = \frac{P}{4\pi R^2} \qquad R_{sun\text{-}Earth} = 1.496\times10^{12}m$$

$$I_{ES} = \frac{P_{sun}}{4\pi(1.496\times10^{12}m)^2} = \frac{P_{sun}}{2.81\times10^{25}m^2} = \frac{3.8\times10^{26}W}{2.81\times10^{25}m^2} = 13.5\,W/m^2$$

I_{ES} = Intensity of Sun light at Earths orbit

P_{ES} = Power Earth feels from Sunlight

CA = Cross sectional area of Earth $= (6.371\times10^6m)^2\pi$

$$P_{ES} = I_{ES}\,CA = (13.5\,W/m^2)(6.371\times10^6m)^2\pi = 1.72\times10^{15}W$$

If we put a solar energy concentrater near Sun (10^3m) how much can we improve to power the Earth recieves from Sun?

I_{CS} = Intensity of Sunlight @ concentrater

$$I_{CS} = \frac{P_{sun}}{4\pi(10^3m)^2}$$

P_{CS} = Power concentrator feels from Sun $\quad A_c$ = area concentrator $= 100m^2$

$$P_{CS} = I_{CS}A_c = \left(\frac{3.8\times10^{26}W}{4\pi(10^3m)^2}\right)(10m)^2 = 3.02\times10^{23}W$$

$$\frac{3.02\times10^{23}}{1.72\times10^{15}}\times100 = 1.76\times10^{10}\%\ !$$

P_{MS} = Power, if concentrator we in Mercury's orbit

$$= \left(\frac{3.8\times10^{26}W}{4\pi(5.79\times10^{10}m)^2}\right)(100m^2) = 9020W$$