Momentum Transport in Electromagnetic Plane Wave

The momentum transported by an electromagnetic wave is proportional to the energy transported.

Momentum density: $\dfrac{\vec{p}}{V} = \dfrac{\vec{S}}{c^2}$, where $\vec{S} = \dfrac{1}{\mu_0}\vec{E}\times\vec{B}$ is the Poynting vector.

When the wave is absorbed by a material surface it exerts an impulse $\vec{F}dt = \Delta\vec{p}$.

The resulting radiation pressure is the average force per unit area:

$$P_{abs} = \frac{\bar{F}}{A} = \frac{p}{Adt} = \frac{p}{Adx}\frac{dx}{dt} = \frac{p}{V}c = \frac{\bar{S}}{c} = \frac{I}{c}.$$

The radiation pressure exerted by a reflected wave is twice as large: $P_{ref} = \dfrac{2\bar{S}}{c} = \dfrac{2I}{c}$.