The Rest Mass Value of the Earth and the Moon

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Abstract

Here we will look at the value of the entire Earth if it is viewed simply as a form of rest-mass energy that theoretically could be extracted. However, as it would not be sensible to use our own planet (our only home at this time) as a form of energy, a better alternative would be to sell the Moon to aliens. So, we will calculate what the value of the Earth, the Moon, and other planets might be from an energy perspective. Of course, if advanced aliens ever do visit us, they might just look at the Earth as a clump of fuel; if they were sympathetic to human beings, they could pay us for it and let us keep the Moon, or even better, they could let us keep the Earth and they would pay for the Moon instead. On the surface, this is just an entertaining thought experiment, but there are deeper implications on valuation, energy forms, and negotiations within this story.

Key Words: Rest-mass energy, value of energy, aliens.

The Value of the Earth and the Moon

For an alien civilization that has fully mastered the knowledge behind the formula $E = mc^2$, the minimum value of the Earth should be the value of its rest-mass energy. The rest-mass energy of the Earth is

$$E = Mc^2 \approx 5.972 \times 10^{24} \text{ kg} \times c^2 = 5.32 \times 10^{41} \ Joule \tag{1}$$

One KwH is about 3.6×10^6 Joules. If we assume a wholesale price of 5 cents per KwH at market rates from recent times, then the energy value of the Earth is

$$\text{Value Earth} = \frac{Mc^2}{3.6 \times 10^6} \times 0.05 = 7.45 \times 10^{33} \text{ USD} \tag{2}$$

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Similarly, for the Moon we have

$$\text{Value Moon} = \frac{Mc^2}{3.6 \times 10^6} \times 0.05 \approx \frac{7.35 \times 10^{22}}{3.6 \times 10^6} \approx 9.17 \times 10^{31} \text{ USD} \tag{3}$$

In the year 2020, there are about 37 trillion USD (equivalent) in the world, that is 37×10^{12} USD which is not anywhere close to paying for the entire Earth or the Moon. This means that we have very good reserves, and if a global financial crisis should take hold and deepen, then we could consider selling the Moon to wealthy aliens.

If we sold the moon, we could sell it with delivery FOB (free on board). The minimum storage size of the Moon is likely its Schwarzschild radius, which is about one tenth of a millimeter for the moon.

If you ruled the world, you would only have 37 trillion USD, but if you ruled $E = Mc^2$ also in practice, that is, if you understood transmutation (cold fusion) and had a space fleet to control the solar system, then you would be worth 6.71×10^{25} times that amount.

Planet	Mass kg	Schwarzschild radius	Joule	KwH	Value USD
Earth	5.974E+24	0.0089	5.37E+41	1.49E+35	7.457E+33
Moon	7.348E+22	0.0001	6.60E+39	1.83E+33	9.172E+31
Mercury	3.301E+23	0.0005	2.97E+40	8.24E+33	4.121E+32
Venus	4.867E+24	0.0072	4.37E+41	1.22E+35	6.075E+33
Jupiter	1.899E+27	2.8263	1.71E+44	4.74E+37	2.370E+36
Saturn	5.685E+26	0.8461	5.11E+43	1.42E+37	7.096E+35
Uranus	8.682E+25	0.1292	7.80E+42	2.17E+36	1.084E+35
Neptun	1.024E+26	0.1524	9.20E+42	2.56E+36	1.278E+35
Sun	1.989E+30	2960.2526	1.79E+47	4.97E+40	2.483E+39
Solar system	1.992E+30	2964.2234	1.79E+47	4.97E+40	2.486E+39
Money in the world					3.700E+13

Table 1: The table shows the rest-mass value of the planets in our solar system plus the value of the Sun. As we can see, the value of all money in the world as of this day, about 37 trillion USD (equivalent), can not even buy a fraction of the Moon. We are nothing more than ants on the surface of a planet, until we truly master $E = Mc^2$ also in practice we will not be rich.

Disclaimer

Clearly, it is worth noting that the energy price per KwH, as well as other energy units, can swing significantly. Therefore, we reserve the right to alter the price of the Moon at a future date. Any aliens reading this must be prepared to pay the market price. Delivery: FOB.