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Global Warming Analysis Upgrading Cross Check and Opened Questions

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Abstract:- Aim of this research is to verify the results presented in [7] [8], using the indications guideline published in [4], conclusion and opened questions.

Keywords:- *BTU, Dynamic Balance, Feedback, Joule, Quad.*

I. METHOD

On July 26, 2022, [4] U.S. Energy Information Administration - EIA, has published all the data relating to Energy, providing a single and certified reference, to be used to verify the correctness of the results obtained, an ESSENTIAL starting point for understanding the climatic impact we are living.

At first, I believe it is necessary to complete the relationships between numeric prefix, its abbreviation, and the consequent scientific annotation considering the introduction of British Thermal Unit - BTU, expressed in "short scale" values.

kilo	k	10^3	
Mega	M	10^6	Million BTU
Giga	G	10^9	Billion BTU
Tera	T	10^{12}	Trillion BTU
Peta	P	10^{15}	Quadrillion BTU [4].
Exa	E	10^{18}	
Zeta	Z	10^{21}	
Yota	Y	10^{24}	

1kWh = 3,412BTU [4]
1toe = 11,630kWh
1toe = 39.68MBTU
1Gtoe = 39.68PBTU or 39.68QuadBTU

1BTU = 1,055J
39,68PBTU = 41.86EJ

1toe. = 11,630kWh
1Gtoe = 11,630TWh

1toe = 41.86GJ
1Gtoe = 41.86EJ

1Gtoe=11,630TWh=39.68PBTU or 39.68QuadBTU= 41.86EJ

This verification shows that different units are equivalent and in agreement with EIA definitions.

The basic concepts and results showed in [7] [8] are correct.

According to [13] reported data, in 2021 Total World Energy was ~
581,320,000,000,000.0 BTU, that is 581.32TBTU, or 0.01465 Gtoe.

The correct Value should be ~14.65 Gtoe, equivalent to:
14.65 • 39.68P BTU= ~581.32PBTU or 581,320,000,000,000,000.0 BTU

In the Countries using BTU units "short scale", there will be a problem when using the wrong BTU conversion, because it represents the starting point for the whole global warming analysis, comprehension, and proposal of solutions to this Vital problem.

I Will come back on this subject in the CONCLUSION of this research.

In period 1860÷1980 the conversion factor 1Gtoe = 11,630 TWh has been used for data Analysis of [3].

I reported the basic formulas used in [7] and the explanation of meaning, for more visibility purpose.
T° = Temperature variation
E = Energy
SHw = Water Specific Heat
Sha = Atmosphere Specific Heat
mw = Water Mass
ma = Atmosphere Mass

T°= E / [(SHw • mw) + (SHa • ma)] (1) {C° = J / [(J / kg C°) • (kg)]}

T° = 0.0086°C every 1Gtoe or 11.630TWh or 39.68QuadBTU.

In(1), with T° = 1°C, it means that
E = [(SHw • mw) + (SHa • ma)]

Now I can calculate "mw" involved up to the thermodynamic equilibrium point:

mw = [E - (SHa•ma)] / SHw (2).

I have forgotten to show (2) in [7].

[(590•42E) - (1k•2.44E)] / 4.2k = 5.32Ekg

Water Specific Weight = 1kg/dm³

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5.32Ekg = 5.32Mkm³.

The Value of 4.62Mkm³ [7] considers thermal inertia concept.

In [8] I reported a wrong value of 4.32Mkm³ instead of 4.62Mkm³.

II. DISCUSSION

Feedback generated by our lifestyle starting from 1712, inspired from [2].

- Year 1712: discovery of the possibility of using combustion to produce mechanical energy.
- Increased energy demand due to new machinery and new technologies.
- Increase of CO2 and/or heat emission in the environment, with consequent increase in temperatures.
- Progressive decrease in the mass of ice, due to balance of the terrestrial thermodynamic equilibrium.
- Additional energy request for air conditioning in closed living spaces.

THE FEEDBACK CYCLE IS ACTIVATED From an elaboration made by: NASA GISS HadCRUT NOAA Japan Met Berkeley Earth using different scale representation of [1], it is evident that the increase in temperatures began around year 1910 and ended in 1940, in this period the total energy requirement was ~ 49Gtoe.

In the period from 1940 to 1965, there was a reduction of the temperature, and the total energy requirement was ~68Gtoe.

In [8], I start from 1950, instead of 1965; in this period the Total Energy requirement was ~49Gtoe, practically the same quantity in 1910÷1940 period, with the result that DOES NOT change the Total amount.

The concept that I apply in updating the data in [8] is to separate the energy supply that causes temperature decrease, linking it to that of Latent Heat.

Consequently, the latest values of [8] updated up to 2018 are:

164 + 68 = 232Gtoe (latent heat)

589 - 68 = 521Gtoe (specific heat)

In [8] I used the ratio between Water Specific Heat and Latent Heat of:

4.2k / 333k = ~ 1/80

Using the more correct Ice Specific Heat of 2k, the update ratio Is:

2k / 333k = ~ 1/167

Considering this ratio, the new value is 232/167 = ~1.4Gtoe, instead of previews 2Gtoe

Finally, in agreement with other scientist's considerations, I have to point out the increasing of the slope in real temperatures measurements, starting approximately in 2010÷2015 period, indicating a probably increase in warming velocity.

The CO2 balance, represented by

"CO2 emission naturally from the whole living systems plus CO2 emission for the production of Energy, minus CO2 reabsorbed by ecosystems", presents only 3 situations:

- be greater than zero: greenhouse effect and temperature will continue to grow
- be equal to zero: the greenhouse effect and temperature will stabilize over time when the equilibrium level is reached.
- be less than zero: the greenhouse effect and associated temperature will begin to decrease.

Data referred to recent years indicate that with annual emissions of 36Gton for Energy production, Ecosystems are still able to reabsorb ~50%, that is ~18Gton every year.

With zero Greenhouse emission for Energy production, it will take approximately 52 years to return to 250ppm,

[8] 940Gton/18Gton = 52.

Mandatory requirement is to maintain capacities of terrestrial and marine ecosystems to subtract CO2 emissions.

Very different and in my opinion more worrying is the situation regarding the heat.

In [11] a nuclear conflict with an exchange equivalent to 5000Megaton was hypothesized.

If the value of 1Megaton corresponds to ~ $4.2x10^{15}$J, by deduction 5000Megaton = 21EJ = 0.5Gtoe.

So the total energy assumed in 1987 should have been about 7.8Gtoe [3] + 0.5Gtoe = 8.3 Gtoe, which according to [11] should correspond to 8.3Gtoe • 12% = ~ 1Gtoe exchanged with Space.

The earth's energy balance:

"Solar energy entering with the addition of energy produced by men, from which to subtract the energy dispersed in space", also in this case it can have only 3 conditions:

- be greater than zero: the temperature will continue to rise.
- be equal to zero: the temperature will stabilize at the equilibrium level.
- be less than zero: the temperature will begin to decrease.

The Capacity of Heat Dispersion in Space therefore represents the keystone to consider.

It therefore needs to be CERTIFIED at WORLD LEVEL and monitored over time, because it will be the litmus test that will measure the overall ability of our lifestyle to maintain and preserve Total Life on Earth. [5]

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III. CONCLUSION

The multidisciplinary analysis of the period 1940÷1965, represents the Hope that we can manage to contain and even reduce the temperature.

By way of example, an Energy Balance = -0.5Gtoe, it will take more than 1,000 years (521 / 0.5) to lower the temperatures.

In the 4 years from 2019 to 2022, we produced energy for a total of about 50Gtoe, corresponding to additional 100 years of sacrifices (50 / 0.5)

Faced with the breadth of these values, the need for substantial changes that will be part of new paradigms of human life is increasingly evident.

The situation described in the research requires a general and in-depth reflection that leads us to an inner awareness of the state of things, through a multidisciplinary extended to all fields of human knowledge.

An important consideration concerns the fact that we should preserve the combustion processes in case of a vital emergency or a new future glaciation.

The last motivation is to reach a Global Harmony, that I Imagine can be resumed in a concept of "Global Dynamic Equilibrium".

Just as an example, if 1Gto should represent the measured and real dispersion capacity of the Earth System, compared to a world population of 8G of people, it would correspond to: 0.125toe or 1.45MWh or 4.96MBTU or 4.96MilBTU or 5.2GJ, intended as an Annual Per Capita Value.

This value would be considered ABSOLUTELY NOT NEGOTIABLE as happened in the past for CO2 quotas.

This is because the overall ability to be able to live with a lower value will determine the duration of the period necessary to bring the ice reserves back to safe levels, that is, to an ocean temperature at least to the levels of around 1900.

By analogy, given that a 1°C increase in human body temperature represents the transition from health to disease, it should be extended as a concept to the entire Planet. In fact, we should consider the danger of reaching a temperature increase of 1.8°C in the ocean waters, because we would endanger the formation of the Polar Banks with all the consequences currently unimaginable, as well as representing a probable point of no return.

In [6] the explosion of the Tambora volcano in the summer of 1816 and the associated famine is analyzed.

The danger of adopting atmospheric dusts to decrease temperatures is expressed, due to the associated side effects, so far disastrous and uncontrollable results.

In [10] a thought from Albert Einstein is cited: "We cannot solve our problems with the same level of thought that created them".

I have always thought that opposing opinions have their own underlying validity.

For example, there are those who claim that there is no overheating problem.

The only method that can be used to arrive at a common synthesis is represented by the scientific method, based on mathematical laws, in which it is necessary to demonstrate the validity of the assumptions made.

Referring to the conversion problem of the units of measurement detected after the formalization of the data by [4], any person, unknowingly using an incorrect starting data, would have come to conclude that the main problem was not heat but gases greenhouse.

In fact, using the wrong energy value, we get $8.6 / 10^{6}$ ° C for each Gtoe instead of the correct value of $8.6 / 10^{3}$ ° C for each Gtoe.

"Ubi maior minus cessat"
"Errare humanum est" but fortunately "Numbers do not lie"

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