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Research Article

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The World's Newfound Capability to Limit Global Warming and Climate Change

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Abstract

The purpose of this Research Article is to present newfound knowledge that disputes the technical correctness of future global warming results that have been published by the United Nations' (UN) climate agencies. The differences in calculated results will be compared in terms of the global carbon dioxide (CO2) emission reductions necessary in order to meet the 1.5-degree Celsius(C) goal of the Paris Agreement (PA). In addition, in order to show what this implies for individual nations, the CO2 emission reduction differences will be shown for the top 20 nations both in their totals and on a per-year basis.

1. Introduction

It is with extreme pleasure that I can announce, unequivocally to all the nations of the World that an astounding discovery has been made with respect to our ability to successfully limit ongoing global warming and the resultant climate change to our planet Earth. We can truly rejoice in the newfound knowledge that the United Nations' (UN) climate agencies have. inadvertently grossly overestimated the impact of new methane (CH4) emissions upon global temperature increase (this issue will be discussed in more detail later). After making the necessary corrections to future CH4 atmospheric concentrations, new verifiable calculations show that our nations now have a substantially improved capability to meet the temperature increase goals of the PA within this century. Those goals are 1.5 to well below 2.0-degree C above preindustrial levels.

2. Summary of Global Results

In my technical review of results published by the UN, both the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Environment Programme (UNEP) have calculated that 100% of CO2 emissions must be eliminated by the year 2050 in order to meet the 1.5-deg. C goal. That implies that the present 40 Gigaton (Gt) per year of CO2 emissions must be reduced at an average rate of 1.43 Gt per year over the remaining 28-year period. In stark comparison, after making the correction for calculating the true effect of new CH4 emissions, my newly published Research Article in the Journal of Robotics (reference 1) shows that the 1.5-deg. C goal can be met using a linear CO2 reduction pathway over a 50-year period ending in approximately 2070 at a net-zero allowable and continuing level of 12 GtCO2. That pathway calls for a reduction rate of only 0.56 Gt per year. That is an annual factor of 2.6 less global reduction amount required per year. That represents a tremendous benefit to all nations, but at slightly differing amounts based upon each particular situation.

3. Summary of Individual Results for Top Twenty Nations

Of course, each nation will be interested in exactly what the new "global" reduction pathway implies for them in particular. This can be accomplished when we are willing to distribute the remaining 12 GtCO2 of global emissions allowed in 2070 on a fair-share per capita basis of 1.5 tCO2 for 8 billion people. Then each nation can determine their acceptable sustaining level of emissions in 2070. It is assumed that the required individual national reductions can be achieved gradually over the 50-year interval. One must be aware that this may not be the path actually followed, but it is a good starting point for illustrating the substantial benefits of making the necessary CH4 correction to temperature increase.

Table 1 is presented first as a tabulation of the top twenty nations estimated CO2 emissions in 2020. It then deducts their ending fair-share amount based upon their population, to end up with the net reduction necessary. Then the yearly reduction is calculated over a fifty-year period in terms of amount and a percentage of the original CO2 emission level in 2020. In particular, it is noted that all nations will benefit by having the lowered global reduction amount of 28 GtCO2 and the additional length of time to achieve the allowable 12 Gt net zero level. The maximum yearly percentage reduction rate necessary is for Saudi Arabia at 1.84%, while India can now get by with only 0.14% because its 1.5 billion population qualifies for massive fair-share credits of 1.5t per capita. On

average though, the required reduction rates are close to 1.5% per year for the top twenty nations. It is worth noting that some fifty of the emerging nations will not be required to make any reductions whatsoever at their current low per capita levels.

Table 2 is presented to illustrate the estimated future benefits of corrective action to methane emissions relative to the present IPCC and UNEP strategies. You will note the CO2e numbers differ from CO2 only in Table 1 because of the adjustments made to develop "equivalent" CO2 amounts for plus and minus amounts of new methane emissions. The improvement shown by the factor in the last column is impressive for all nations. In particular, the high population nations of India, Brazil, Indonesia, Mexico, Argentina and Egypt, show a tremendous benefit, with China, Russia, Turkey, South Africa and Kazakhstan not far behind. I believe they will all be overjoyed to learn of the substantial revision of the UN results. Now that we have all been blessed with a rather miraculous discovery that greatly eases the future workload in making CO2 emission reductions, let us all make a renewed dedication towards realistically meeting those new lower requirements. We have been granted a second chance at success in curtailing climate change that cannot be ignored.

Nations*	Population	2020 CO2	Fair-Share	Reduction	Per Year Mt	Per Year %
	Thousands	Megaton	Megaton	Megaton		
China	1,433,784	9,443	2,151	7,292	146	1.55
United States	329,064	5,626	494	5,132	103	1.83
European Union	consortium of nations not yet available					
India	1,366,417	2,411	2,049	362	7.2	0.14
Brazil	211.049	504	317	187	3.6	0.71
Russia	145,872	1,433	219	1,214	24.3	1.69
Japan	126,860	1,288	190	1,098	22.0	1.7
Indonesia	270,626	673	406	267	5.3	0.79
Iran	82,914	725	124	601	12.0	1.66
Germany	83,517	825	125	700	14.0	1.70
Mexico	127,576	455	184	271	5.4	1.19
South Korea	51,200	600	77	523	10.5	1.75
Canada	37,411	525	56	469	9.4	1.79
Turkey	83,430	399	125	274	5.5	1.38
Saudia Arabia	34,269	645	50	595	11.9	1.84
Australia	25,203	376	38	338	6.8	1.35
South Africa	58,558	337	88	249	5.0	1.48
United Kingdom	67,530	521	101	420	8.4	1.61
Kazakhstan	18,551	229	28	201	4.0	1.75
Argentina	44,781	167	67	100	2.0	1.20
Egypt	100,388	227	151	76	1.5	0.67

*The order of Nations shown reflects the same sequence as designated by the Climate Action Tracker (CAT) October 2022 update to maintain ease of reference for comparison purposes.

Table 1: Top Twenty Nations for Year 2020 CO2 Emissions Reduced to Fair-Share by Year 2070

Nations	2022 CO2e	Per Year Mt*	Per Year Mt	Factor Higher
	Megaton	0ver 28 years	per Table 1	wrt Table 1
China	14,100	504	146	3.5
United States	6,300	225	103	2.2
European Union	3,400	121	n/a	n/a
India	3,200	114	7.2	15.8
Brazil	1,100	39	3.6	10.8
Russia	2,200	79	24.3	3.3
Japan	1,150	41	22.3	1.8
Indonesia	950	34	5.3	6.4
Iran	900	32	12.0	2.7
Germany	750	27	14.0	1.9
Mexico	690	25	5.4	4.6
South Korea	680	24	10.5	2.3
Canada	680	24	9.4	2.6
Saudia Arabia	590	21	12.0	1.8
Turkey	550	20	5.5	3.6
Australia	520	19	6.8	2.8
South Africa	500	18	5.0	3.6
United Kingdom	400	14.3	8.4	1.7
Kazakhstan	360	12.8	4.0	3.2
Argentina	350	12.5	2.0	6.3
Egypt	330	11.8	1.5	7.9

*Please note the yearly % reduction rate is simply one-28th or 3.6 % of the total CO2e. The continuing methane emissions are offset by the additional CO2 reductions to reach net zero.

Table 2: Top Twenty Nations for Year 2022 CO2 Equivalent Emissions Reduced to Zero by 2050

4. Climate Change Wake-up Call to the World

All the climate change scientists and analysts in the world must be made aware that the global temperature increase calculations made for new methane (CH4) emissions by the United Nations (UN) climate agencies are grossly incorrect. Both the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Environment Program (UNEP) have treated future estimated CH4 emissions as if those yearly amounts add directly to existing atmospheric concentrations, and make no allowance for the natural dissipations that occur due to CH4's approximate12-year lifetime. The formula used for conversion of new CH4 emissions into equivalent CO2 emissions was initially adopted in 1990 for the first IPCC Assessment Report (AR1). Later, it was inadvertently specified as a rule at the 2015 Paris Agreement (PA).

As a consequence, their calculated increase in temperature rise for CH4 is excessive, and serves to restrict the temperature rise allowed for carbon dioxide (CO2) emissions in order to meet a given combined temperature rise amount. Further, the restriction imposed on CO2 emissions will force a significantly higher rate

of yearly reductions to be performed in a shorter period of time. Lastly, their emission reduction strategy calls for still further CO2 reductions in order to offset their estimated continuing CO2 equivalent emissions attributed to CH4. The resultant CO2 emission reduction pathway required is steeper than would otherwise be needed to meet the 1.5-degree Celsius (C) goal of the PA. The IPCC report called for the total elimination of the initial 40 Gigatonne (Gt) of CO2 emissions in 2022 by the year 2050. That amounts to an average annual decrease of 1.43 Gt per year (equal to 3.6 %/year). That high reduction rate has been judged to be unachievable based upon our limited experience over the last few years.

This author performed an independent analysis of the CO2 emission reduction pathway that would satisfy the PA's 1.5-deg C goal starting with 40 GtCO2 in 2020. It was published by Nature Climate Change under open access (OA), and also by the Journal of Robotics and Automation Research (ISSN: 2834-7706). It is entitled "Assessment of Global Temperature Rise Based Upon Approved Algorithms", dated January 3, 2023. In stark contrast to the IPCC results, that new analysis showed the required CO2 emission reductions could be performed over a longer 50-year period of time until 2070. In addition, the ending net-zero level of allowable continuing CO2 emissions was 12 Gt. The linear emission reduction pathway called for 0.56 GtCO2 per year (1.4%/year). That represent a factor of 2.6 less yearly CO2 reductions than reported by the IPCC. So, we now have a more realistic pathway defined that should prove more feasible to actually accomplish within our energy conversion and financial constraints. But it will still take the willpower of everyone to successfully complete.

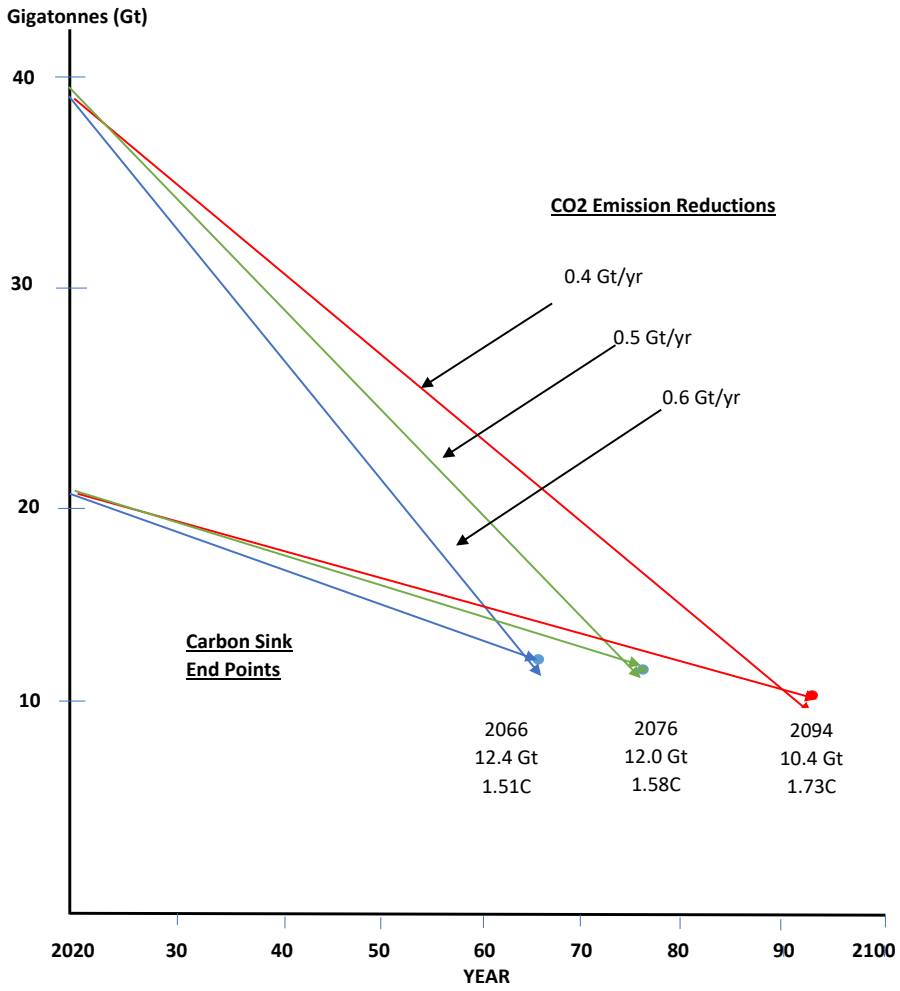

Figure 1: CO2 Emission Reduction Pathways to Net Zero