CO2 and CH4 absorption powered by nuclear fusion, via fission, is the only way to manage climate change and the Planet's trigger points

Stephane H. Maes[1]

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Abstract

We propose the only viable way to still save the planet for humanity. Indeed we argue that the planet climate and ecosystems has already triggered several trigger points. In such systems, change will change exponentially with time, even without any source of excitation anymore. As a result, all our prediction of climate change impacts are already underestimating the effects, as we observe daily, and feel-good measures like grass root ecology or emission reductions are just too late and risk distracting from what needs to be done, now, not later. There is no time for later.

The proposal is as follows: to starve off the exponentials, we must re-absorb CO2, CH4 and any other relevant pollutant to preindustrial levels without re-emitting other fossil fuel. It is a planet scale endeavor that requires nuclear fusion to power it. While we learn to dominate fusion, we must use nuclear fission to start re-absorption now. We can't wait. We have to start now.

1. Introduction

This brief note discuss a plan and proposal that we have together since early 2019 as the (only) solution to address climate change a change the planet.

2. Climate change vs. trigger points

Hints of climate change started to reach a wider audience since the 1980s, with ever reefing models and predictions.

International organizations have gone from initiative to initiative to mitigate the risk, mainly by securing commitments and plans to limit emissions in order to control and limit the average temperature rise of the planet. None have been seriously respected or addressed.

But more importantly, many recent articles and reports have indicated that climate changes effects are way larger than expected or predicted. Examples include ice sheet or glacier melting, temperature raises in Arctica or Antarctica, impact on oceanic currents, salinity, sea level raise, droughts in many regions, floods in others, fires and weather damages, species extinction, etc.

In general the lesson is always that whatever we have predicted has always underestimate what would happen. It can be because effects were forgotten or mismodeled, consequences were not considered, complexity was misunderstood, etc. Improving the models still misses and misses. The problem is not just that tipping/trigger point are about to be passed and triggered but that we miss many, typically those with positive feedback loops, and for those we know or model miss effects that add to the feedback loops.

[1] shmaes.physics@gmail.com

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Today, reports clamor many trigger points about to be reach in a non-distant future. We like to see a trigger point in control theory as the moment that a (complex) system does not need external excitation (source) to continue its own (exponential) excitation, typically characterized by an exponential growth in time. For details you can consider [1]. Beyond the tipping point the system is out of control and exponentially evolve until reaching a new system state modeled differently or it become chaotic. *Note added on November 24, 2002: See also [16] on how to treat when the system evolves and or become chaotic.*

Most reports claim triggers points are not yet reached, but they will soon.

3. Tipping or Trigger points have already been triggered

We argue that these trigger points have already been triggered. Simply because the systems are so complex and so interdependent and so many relationships in the earth ecosystem not yet fully understood. So our models are incomplete. Being at the edge of triggering such a complex system has certainly already trigger some subsystems.

We claim that this is why everything seems to be worse than expected when studied: exponentials are already running! And you can't outrun exponentials long. We are running out of time!

Note added on November 24, 2022: [2] captures in the comment sections, some examples of recent announcements that hints that trigger points have been reached. See in particular: [3-14] for an non exhaustive list of articles on some tipping point, typically poorly known, and article warning about the implications.

4. Implications

The implications are immediate: removing the sources or excitation will not change anything… So for example, the planet is bound to collapse even if we reduce to zero or fossil fuel emissions. All these great feel-good actions but useless to solve the problem and stop the guaranteed catastrophic outcome.

5. Can something still be done?

Control theory gives you a recipe. If reducing or stopping the excitation / source is too late; the only way is to modify the controlled system.

6. CO2 and CH4 absorption from the Atmosphere

We must remove the main culprit from the atmosphere; i.e. remove CO2 and CH4 from the air. As much as possible and as fast as possible.

What we need is a planet scale earth forming initiative to try to absorb and store (or use without re-emission) carbon dioxide, methane and any other problematic fossil gas from the atmosphere to bring ASAP the level to at least pre-industrial levels.

And we must do it as soon as possible. Before the exponentials catch up with us. If we lower the levels enough we may be able to starve the already triggered exponentials.

So, no terraforming of Mars… We need to do it here, now, Yesterday!

There are many technical solutions to do so. The key issues are cost, energy and scale. Of course focus and progress on improving the technology and innovative new approaches can only help. Focus on education and research is key.

7. Nuclear fusion, via Fission is the only way forward

To do this on a planetary scale ASAP, we need to address the main issue: cost and energy. Of course, they both are directly linked.

It is critical to feed the energy hungry system required to re-absorb CO2 and CH4, for free and without emitting any more pollutants. The only solution is fusions that would provide cheap and unlimited energy.

A lot of progress has been made, with predictions that fusion may be mastered in 20 to 40 years. It is good but not good enough! Remember we are running against running exponentials.

So meanwhile we should

- Invest in education, research in Fusion, and incentivize the best engineering, physicists and technical brains to focus on fusion, even if it means putting other fields in hiatus.
- Invest and rely on nuclear fusions, as secured as possible, to start immediately re-absorption of CO2 and CH4, while waiting for fusion. It is a bet that we must make now or we will lose the race against these exponentials.
- Invest and incentivize as many initiatives as possible that absorb CO2 or CH4, as much as possible.

Note added on November 24, 2022: At least it seems that we are getting there slowly. See fusion and CO2 removal comments in [2]. Also see the article in Nature that seems to align with our first bullet recommendation above [17].

8. Conclusions

There is no time to waste. Climate waste is racing with triggered exponentials in a system we barely understand how to model. The only solution is to immediately start re-absorbing CO2 and CH4 from the atmosphere to bring the levels to pre-industrial levels and store or reuse them with no re-emission, or even lower to starve the exponentials. To power such planet wide terraforming initiative we need energy sources that does not emit more fossil fuels: nuclear fusion. We must accelerate its control and deployment. Meanwhile we have no other choice than to et on nuclear fission to start re-absorbing or we will lose the race.

All other ecological, grass root or even emission reduction initiatives are meaningless. They are just feel-good and unfortunately, if done instead of implementing our proposed plan, they risk slowing down implementation in such a plan and we will lose the race against the exponentials.

We have only a few decades to starve the exponentials and save the planet. Otherwise, we will just be one of those civilization that auto-destroyed. It’s not an hypothesis, it isa well understood evolution of systems.

Sure the planet will not be destroyed. It probably will just evolve to shrugs us of it, and then resume its ecosystem with new life forms. Do we really want this to happen? *Note added on November 14, 2022: See for example [18].*

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