

ENERGY CRISIS AND GLOBAL WARMING - THE NECESSITY OF A PARADIGM CHANGE

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Abstract: The paper points out the necessity of changing the climate paradigm; instead of mitigating global warming, we should work on planetary climate management. Therefore, the idea of a climate millennium intervention – as a model of climate management – is presented, which the author published in 2008 in his book "Three Essays on Science" and sent to the GOOGL public competition "Ideas that change the world". These proposals did not have a major impact on the professional and scientific public, but – as the existing practice of adapting to global warming has not proven successful in the past two decades – the need to initiate a planetary discussion on the proposed model of climate management is once again pointed out.

Key words: Air currents, Climate control, Global warming, Ocean currents, Orbital lampshade

1.INTRODUCTION

In 2008, at the GOOGLE competition Ideas to Change the World with Project 10⁴100 (September 24, 2008), I submitted the idea "Millennium Climate Intervention", which is also described in my book "Three Essays on Science" (fig. 1); [1]. Basically, it is a proposal to place an orbital lampshade in the Earth's geostationary orbit in order to reduce solar radiation by a certain percentage and thus begin to manage the Earth's climate (Fig. 2). This would provide the necessary time for the use of climate-neutral energy sources. For that occasion - according to my template, a younger colleague from the Faculty - then assistant Zoran Balkić - made a 30-second video simulation of the said idea (fig. 3).



Fig. 1: Cover of the book "Three Essays on Science" and the back cover of the book showing Milanković's climate cycles [1]

Over 150,000 works were submitted to the aforementioned GOOGLE competition, and my proposal for the "Millennium Climate Intervention" was not selected for the award - because according to the propositions, the idea had to be commercial and feasible within two years. I also presented the idea of the "Millennium Climate Intervention" at the international conference VIPSI-2009 Belgrade (Fig. 4).

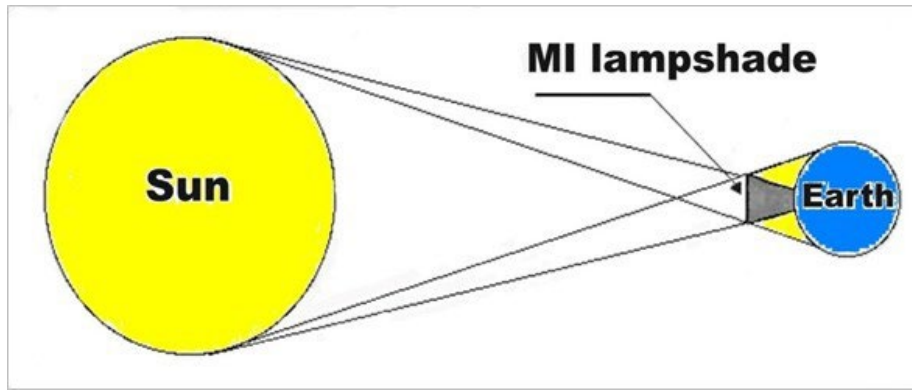


Fig. 2. Schematic representation of the Millennium Climate Intervention [1]

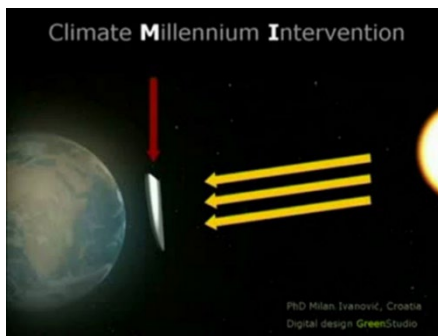


Fig. 3: The first sequence of the 30-second video "Millennium Climate Intervention" (2008) [1]

Fig. 4: Power point presentation cover on VIPSI Belgrade conference (2009) [2] [3]



2. FROM THE KARDASHIAN SCALE TO THE MILLENNIUM INTERVENTION

I worked on the book "Three Essays on Science" (along with obligations at the Faculty and the publication of a dozen books and over 400 papers) for almost 20 years; In the chapter "Laws of the World and the Scientific Paradigm" to illustrate the laws of scientific knowledge, I carefully searched and studied the literature with which I would clarify the differences between the laws that govern: (a) the inorganic world (the law of gravity, for example), (b) the laws in nature (the law of inheritance, for example), and (c) the laws that manifest in society (the law of supply and demand in economics, for example). In this way, for the first group of laws, I processed Kepler's laws, Hubble's law, and the Milanković cycles. Thus, while studying the literature, I became acquainted with the **Nikolai Kardashev scale** and the papers by **Carl Sagan** and **Freeman Dyson** about the level that human civilization has achieved on the path to Type I civilization.

The Kardashev scale (K-scale) has become a general method of classifying the technological progress of civilizations; has three categories, based on the amount of energy used by hypothetical civilizations. [4] [5]

Type I. - A civilization capable of using the available energy of its planet

Type II. - A civilization capable of using the available energy of its star

Type III. - A civilization capable of using the available energy of its galaxy

It should be emphasized that this is about hypothetical (extraterrestrial) civilizations. In addition to theoretical considerations in the development of civilization, which this model of energy use gives a framework for, the Kardash scale is also used in SETI research (Search for Extraterrestrial Intelligence). Human civilization is still below Type I civilization, and the current status of human civilization - according to the Kardash scale - is called Type 0. Although the stage values were not discussed in Kardash's original proposal - the American astronomer Carl Sagan (1934–1996) calculated (using the Kardash formula and energy consumption data) that human civilization (in 1973) had reached level 0.69 [6], and the American physicist Freeman Dyson (1923–2020) made an estimate of the transition of human civilization to Type

I according to which our civilization reached level 0.72 in 2004, and in 2030 it will be at level 0.73. [6],

American physicist Michio Kaku emphasizes that there is a significant set of problems that humanity must overcome in time for human civilization to reach a higher status, i.e. reach the level of Type I civilization. He emphasizes that a civilization that has not reached Type I may be subject to crises, dangers and catastrophes; today, planetary political and social development lags behind technological development and is threatened by ecological collapse (which requires planetary policy to solve such problems), as well as threats of an ice age, collisions with meteors, etc. Kaku cites Dyson's calculation for the achievement of Type I civilization - around the year 2200. This estimate is based on a linear extrapolation of current technological achievements in energy use on Earth - at a rate of 1% per year, and Kaku himself believes that this could happen as early as the 21st century. [7], [8]. Due to the acceleration of the emergence of new scientific knowledge - we believe that Kaku's estimate is justified.

Climate management on the planet is also a fundamental issue for Type I civilizations; this type of civilization, according to Kaku, manages the climate of its planet because it controls the planet's available energy potential. However, Kaku did not answer how to achieve this on our planet, although he points to the need to research technologies that will efficiently extract useful forms of energy from the vast energy potential in the oceans (solar radiation). [9]

2.1. Energy crisis and global warming - the necessity of a paradigm shift

The energy crisis (due to the large increase in energy consumption, and limited resources on Earth) which manifests itself in increasingly expensive energy production and increasing environmental damage - requires new perspectives on the entire energy sector. In addition to this very significant technological and economic problem, today's civilization is faced with another - increasingly serious challenge - global warming, which threatens not only economic troubles but also an ecological danger for civilization in today's context. The climate changes over time under the influence of its own (internal) dynamics and due to external influences. External influences include natural phenomena (e.g. volcanic eruptions or solar variations - Milanković cycles), as well as human activity, which leads to changes in the composition of the atmosphere. Every second, the Earth's atmosphere receives 1.37 W of solar energy per 1 m² of surface area (which is exposed to the Sun). About 30% of this radiation is reflected into space; about two-thirds of this reflection arises from clouds and particles in the atmosphere (aerosol), and surfaces under snow, ice and deserts reflect the remaining third.

Research on global warming by 2000 has shown the seriousness of the situation; data confirms that the earth's climate is changing rapidly. The IPCC (Intergovernmental Panel on Climate Change) has confirmed that global warming is indisputably proven. Unfortunately, efforts to mitigate the warming process so far have been insufficient; many countries have not achieved the goals of the 1997 Kyoto Protocol (which entered into force in 2005 as an addition to the international climate change agreement, signed with the aim of reducing emissions of carbon dioxide and other greenhouse gases). The situation is similar with the implementation of the Paris Agreement (from 2015), according to which countries should work to keep global warming below 2 degrees - in order to avoid the worst effects of climate change. However, practice is recording increasingly serious consequences of climate change. The year 2024 was recorded as the warmest in history, surpassing the previous record from 2023, and extreme weather events, such as devastating fires or urban floods, are becoming more frequent. Global temperature has increased by 1.324 °C in the last 100 years. (Fig. 5 - 6)

The World Meteorological Organization (WMO) has confirmed that 2024 was the warmest year on record, based on six international datasets. The past ten years have been among the ten warmest, with 2024 being about 1.55 °C above pre-industrial levels. [12]

The scale/dynamics of global warming are best shown by satellite images of the North Pole (at the same time of year) and Greenland (Fig. 7 - 9)

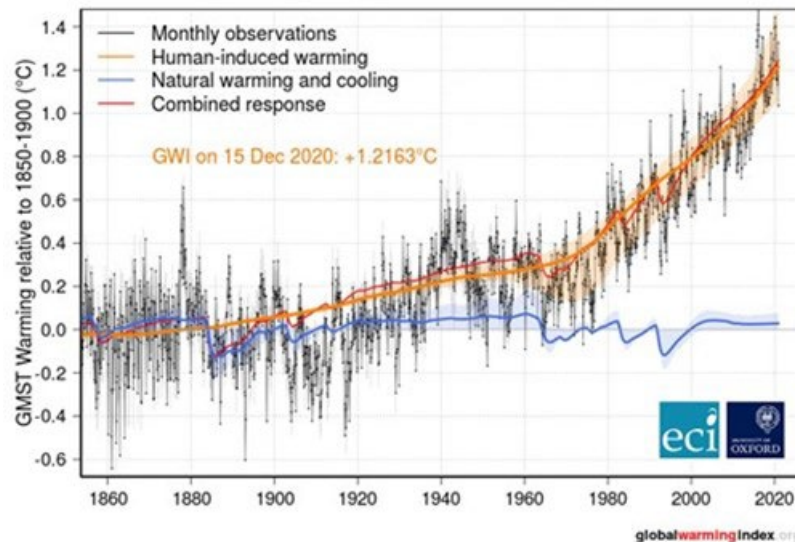


Fig. 5. Global Warming Index (aggregate observation) on Earth updated to Dec. 2020 [10]

Legend

- The black line shows the actual observations of global mean temperature. Although there is some annual variation, the Earth's temperature has been rising steadily since the 1960s. This cannot be explained by natural causes. The blue line shows the estimated contribution to the change in Earth's temperature from natural causes, such as changes in solar activity and volcanic eruptions. These explain some of the variation in global temperatures, but they cannot explain the total warming.
- The orange line shows the estimated contribution of human-induced global warming, caused by burning fossil fuels or other forms of pollution. Because this line closely follows the temperatures observed in the real world, it shows that the overall warming can largely be attributed to human activity. However, it is still not an exact match.
- The red line shows the combined effects of human-induced and natural changes. This line best matches the observed temperatures and shows that human-induced changes, plus some natural influences, have caused the global warming we see today.

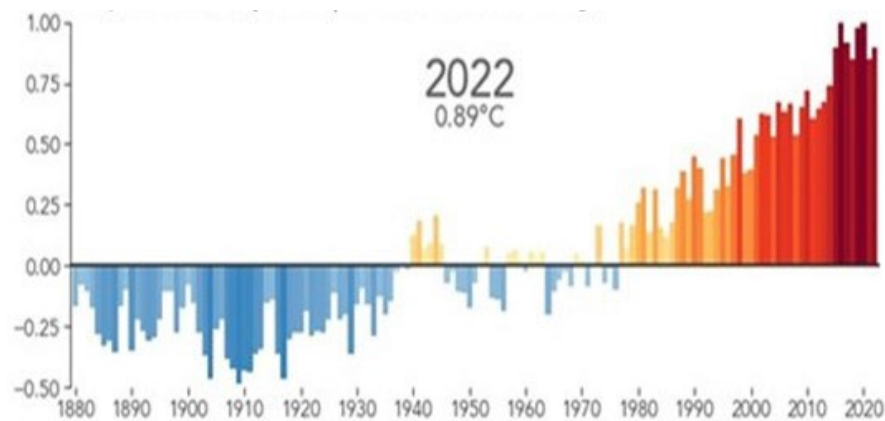


Fig. 6. Global Temperature Anomaly (°C compared to the 1951.-1980 average)
 Last 9 years Warmest on Record [11]

According to current measurements - average temperatures on Earth could increase by several degrees C by the end of the century with far-reaching effects; sea levels will rise and flood coastal areas, there will be severe droughts and large fires will occur more often, insect-borne diseases will spread significantly, and many animal and plant species will be at risk of extinction. According to earlier estimates - an increase in average temperatures by 1.5°C to 2.5°C between 20 and 30% of higher plants and animals will be at risk of extinction. According to other estimates - if the global temperature rises to 4.6°C (compared to the pre-industrial period), the Greenland ice sheet will be threatened, the melting of which will raise sea levels by as much as 7 m.

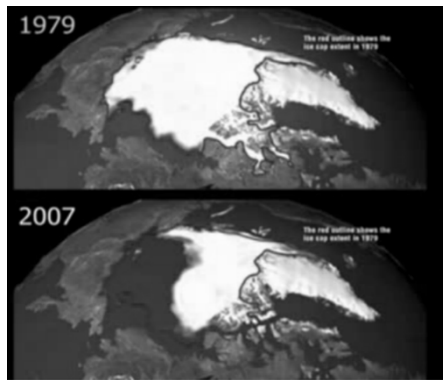


Fig. 7. Melting of the ice cover at the North Pole from 1979 and 2007 [13]



Fig. 8. Melting of the ice cover at the North Pole from 2025 [14]

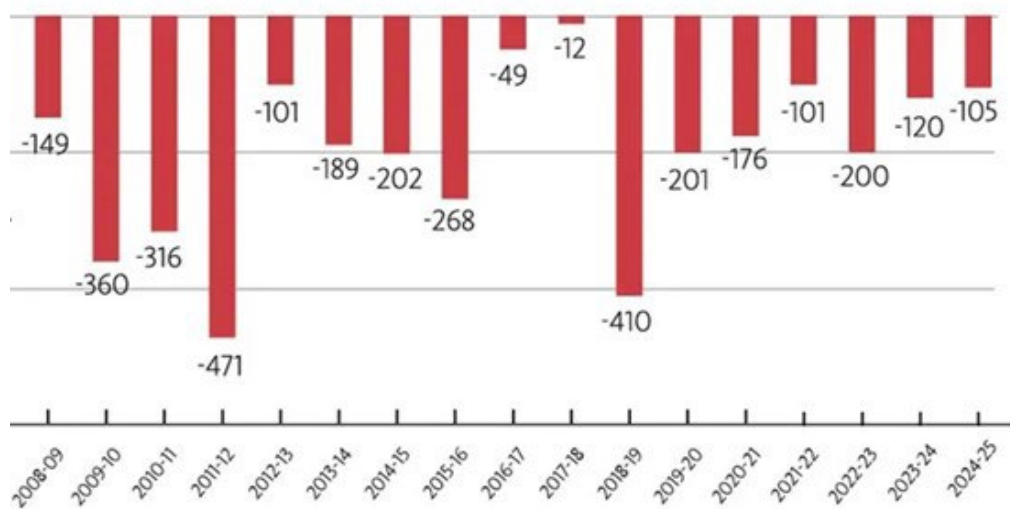


Fig. 9. The Greenland Ice Sheet is shrinking for the 29th year in a row [15]

With the disappearance of the snow cover in the northern regions (Greenland, Siberia, Alaska), two new unfavorable processes have begun:

- deposited methane is released from the thawed soil; large methane emissions into the atmosphere will increase and accelerate the greenhouse effect on our planet.
- the areas under snow on the planet that reflect solar radiation have been significantly reduced
- which contributes to greater heat retention on the planet. [16]

2.2. How to solve this issue of the survival of human civilization?

It is certain that the efforts made so far to understand these changes are valuable - but it should be emphasized that serious warnings about climate change were given even 50 years ago, and the politics and economics of this civilization, unfortunately, were not up to the level of the problem. The UN Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, the International Panel on Climate Change (IPCC), the Paris Agreement, the initiatives of the EU and other supranational and national institutions are on the right track, but they are coming with a significant delay; the implementation of these measures is a particularly problematic issue. In addition, in our opinion, all models of solutions to global warming move within the framework of the existing scientific (ecological) paradigm - which is dysfunctional in a number of elements.

Solutions that propose reducing greenhouse gas emissions and other measures to mitigate global warming are certainly welcome, but the cycle of normalization of CO₂ and other greenhouse gases in the atmosphere is much longer than the available time left according to

warning scenarios. This means that these measures will not prevent global warming from increasing to a level that will not threaten the existing climate regime and the ecological framework of the current state of the planet – even if all countries in the world accept emission reductions (!) and all of them adhere to the planned reduction rates (!).

3. A QUANTUM LEAP INTO A TYPE I. CIVILIZATION

We believe that the existing scientific paradigm and the existing scientific research programs do not offer satisfactory solutions for the coming (big) climate changes in the time frame that remains before the devastating climate consequences. Here we should also express our surprise that in the formulation of existing climate models of global warming, solar radiation is taken as a constant (with the addition of different values for anthropogenic and planetary natural variables). Such an approach certainly makes it difficult to solve the equation of climate change and current efforts to reduce global warming. Likewise - we believe - that the previous forecasts (Dyson and others) of reaching the status of Type I civilization (which start from the linear extrapolation of past energy consumption and extraction technology) are not correct, because - in physics (and science), as well as in technology, there has never been a linear development - so Dyson's method (extrapolation of a linear trend with an increase of 1% per year) basically represents an extrapolation of the past into the future. We must reckon with a quantum leap - as the logic of science implies and as the history of scientific discovery shows.

Our approach to the solution starts from a paradigm shift and creating the conditions for a quantum leap into a Type I civilization - one that controls the available energy and manages the climate of its planet.

3.1. How to manage the climate on Earth?

On the Internet forum of the American physicist Michio Kaku, one participant (2 years ago) asked the question – “how, in general, can the climate on Earth be managed (?)” – and concluded that it is impossible; no one on the Forum answered. We, on the other hand, believe that today's civilization can manage the climate on Earth – only, for this to happen, it is necessary: a) a change in the scientific paradigm, b) the establishment and development of a new planetary scientific program (with a special emphasis on the development of solar technology and new climate models), and c) planetary government.

In the time of previous scientific paradigms (mechanistic and holistic), science did not consider ecological issues (in today's framework); even more so – the development of civilization (within the framework of such scientific worldviews) disrupted the natural balance, endangered a number of ecological conditions on the planet and significantly contributed to the greenhouse effect that contributes to global warming processes. Proponents of the ecological paradigm, on the other hand, emphasize: nature should not be managed but should be cooperated with; This paradigm advocates sustainable development and reduction of environmental pollution and human life in partnership with nature. In this (proposed) partnership, non-aggressiveness of man towards nature is essential and it is necessary to develop new so-called clean technologies and use clean energy; this is especially after the observed processes of rapid climate change (global warming). However, the time horizon available - with the existing level of economic and technological development on the planet - is not sufficient to implement the techno-economic changes of the ecological paradigm in time.

In the current conditions (ex post ecological framework set) and the available time horizon, this kind of orientation in some way - we believe - aims to preserve the development of civilization, that is, it can hinder the ambitions of further development and be a big obstacle to the direction/reach of the level of Type I civilization. Such an attitude in a certain way (implicitly) leads to the regression of human nature - which we consider disastrous. We believe that it is necessary to continue to develop civilization through the proactive action of man on the conditions of his life with the mentorship of nature, i.e. we advocate the Millennium Intervention, which should enable the development of civilization on a new basis while maintaining the present planetary eco-system.

The logic of science grows and develops spirally - starting from scientific facts, through scientific laws and scientific theories to a scientific paradigm. In the further development of science (in the model of accelerated growth of knowledge), in addition to the scientific paradigm (as the supreme principle of science), there must necessarily exist a civilizational (planetary) research program in the meaning of the settings of Imra Lakatos. And finally - the existing approach does not indicate models of proactive climate management - and it is (on the one hand) a priority technological, energy and ecological issue of civilization and (on the other hand) it is the management of ecological conditions (climate) one of the essential features of advanced civilizations.

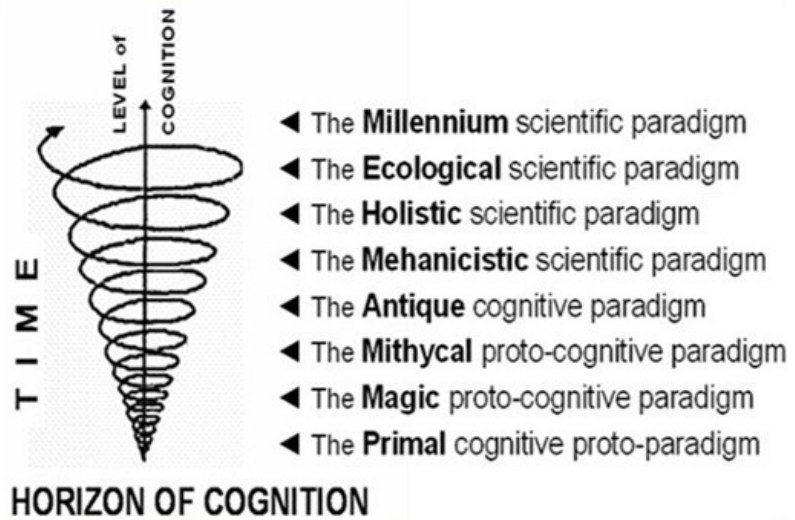


Fig. 10. The logic of growth of scientific paradigms [1]

3.2. Millennium climate intervention

The quantum leap is based on our heuristic model of the solar program, which is based on the Millennium Intervention (MI), i.e. the placement of an orbital lampshade that acts as an obstacle to solar radiation with its surface, reducing the insolation of the Earth; Possible creation of: (a) a mechanical type screen (a kind of aluminum foil) or (b) other so-called 'cloud variants' - such as floating leaflets in an electromagnetic field, or some kind of smoke curtains. By applying MI lampshades, a permanent shadow would be created at a certain place on the planet: a) on warm sea currents that threaten arctic areas, or b) where glaciers are melting or c) around 65° north latitude (Milanković). In this way, solar radiation on the Earth should be reduced, according to the calculation and the degree of progress of greenhouse gases and/or other anthropogenic, natural or cosmic causes of global warming. Of course, it is necessary to first research and create new climate models that will calculate: - the optimal allocation of the MI shadow, - the effects on changes in the direction and intensity of (new) air movements (wind), - the effects on changes in the direction and intensity of (new) sea currents and - the change in temperature (MI shadow) of the surrounding areas. Therefore, solar technology should rise above the Earth's surface and, in orbital conditions, enable climate management and the acquisition (and transport) of energy to the Earth. Scientific research and development of technology within the framework of the solar program are unthinkable without values adopted by consensus, i.e. for such technological ventures and for the realization of the MI screen project, the partnership of all countries on the planet and the planetary government is required, because the issue of the location of the MI screen shadow will be an issue of changes in eco-conditions, on which there will have to be an intercontinental consensus and the authority of the planetary governments.

4. CONCLUSION

- Insufficiently effective measures against global warming - within the existing ecological scientific paradigm - should be replaced by a new approach based on a new scientific (millennium) paradigm.
- Instead of trying to mitigate global warming, a new millennium scientific paradigm should be used to manage the planet's climate.
- The new scientific Millennium Paradigm and the Millennium Climate Intervention can be the first real steps towards a Type I civilization.
- It is high time to start a planetary discussion on this.

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