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Philosophy of the Future: Heat-Generating Factor in the Process of Global Warming, Ways of Disposal of Heat Emissions

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Abstract

The function performed by greenhouse gases is, first of all, energy-saving and energy-regulating. It is known that the temperature in the upper layers of the atmosphere reaches hundreds of degrees Celsius. Having the effect of two-way action, they protect the planet from both external influences and internal factors. However, these functions are not heat-generating and direct-acting factors. Emissions create a protective umbrella of a gas-soot-dust mixture above the earth, which reliably protects the planet, primarily from incoming solar energy. Therefore, this proses is not associated with the creation of additional thermal energy, which has arisen in recent decades. It is well known that a heat source is required to heat a house for example. No gas can heat it. The increase in the concentration of both greenhouse gases and thermal emissions is a consequence of exothermic reactions of burning energy carriers. Thus, the main factor in the process of global warming is the emissions of thermal energy through the activities of the industrial and economic complex and the vital activity of the anthropogenic factor. Their number has reached astronomical proportions, and against the background of the intensification of energy production, global warming on Earth has already become a threat. Most people associate thermal energy as a benefit, but it is known that its excess is deadly for all life forms. It is necessary to strictly limit the use of thermonuclear technologies, especially in the military sector, at least until effective technologies for the utilization of thermal pollution are developed. The main priority for the coming decades should be the development of energy regeneration technologies based on artificial photosynthesis with the absorption of the excess heat generated, as well as the creation of industrial technologies for energy circulation by regenerating energy carriers in the process of endothermic recovery reactions.

Keywords

Global Warming, Energy, Elementary Particles (EP), Photons, Thermal Pollution, Thermal Pollution Dispose

1. Introduction

The problem of global warming, a phenomenon that has led to significant climate changes on a planetary scale, is becoming extremely relevant and attracting great attention of both representatives of the scientific world community, politicians, and representatives of almost all segments of the world's population. As is always the case in such cases, there is no consensus on this issue, especially regarding the role of human civilization in this process.

For billions of years, a natural, balanced mechanism of thermal processes has been working flawlessly on our planet—the natural mutual exchange of thermal energy between the Sun on the one hand and our Earth on the other. In recent decades, it has become obvious that nature is unable to cope with the problem of rising temperatures, which has led to significant climate changes throughout the planet. These changes have become especially noticeable at the poles, in the Arctic, Antarctic, in the highlands, where mass melting of glaciers occurs. All these processes have already become the main threat to wildlife, and most importantly, from year to year there is a rapid increase in these problems. They have become especially evident in the last 20 years, and the increase in their negative impact on the environment has become apparent. The complexity of the problem lies in the fact that it takes years to realize the essence of the mistake itself. It will take decades to develop a strategy and especially effective technologies, to implement measures to process excess thermal energy to suspend and minimize its negative impact. The worst thing is that both intellectual and economic sacrifices are needed to stabilize the situation—the reorientation of the energy sector up to the limitation of nuclear technologies and the complete abandonment of thermonuclear ones. It is extremely necessary to reassess uncontrolled economic activity in industrial production and especially in the energy sector.

The dominant point of view in our time is the unsubstantiated assumption that the cause of global warming on the planet is the greenhouse effect caused by greenhouse gases. However, the heating of the planet, by itself, at the expense of its own available thermal energy by changing the concentration of a certain number of chemically inert components is absolutely impossible. Professors [1] (Lindzen R and Happer W 2025) expressing their opinion o this problem state unequivocally: —"The common belief that CO_2 is the main driver of climate change and the EPA Endangerment Finding assertion that "elevated concentrations of greenhouse gases in the atmosphere may reasonably be anticipated" to endanger the public health and welfare are scientifically false". That opinion is very actual on this regard. Regulation and maintenance of standard atmospheric indicators is

extremely necessary. But reducing CO_2 and other greenhouse gas emissions to zero will not have a significant impact on the planet's thermal regime. It is completely unfounded, and as such that it will harm the environment, especially in terms of agricultural development, since it is CO_2 that is the basis of photosynthesis. Global warming at that time will increase at an increasing rate. The photosynthesis reaction, by the way, is an endothermic reaction with the absorption of thermal energy which is the main factor of global warming. It is a natural regulator of both, the amount of CO_2 in the atmosphere and the heat balance of the planet too. In the summer heat, the coolness in the forest is explained precisely by the absorption of heat by trees and vegetation in the process of endothermic reactions of photosynthesis. Therefore, in the matter of regulating the amount of CO_2 in the atmosphere, you can fully rely on the processes of photosynthesis, both natural and artificial.

The world economy is not able to maintain the proper level of functioning without an efficiently operating energy complex, which cannot do without fossil fuels, and nuclear energy. That is why it is necessary to develop technologies for the energy cycle of synthesis of green hydrogen, ammonia and methane in order to at least partially utilize the amount of heat emissions. Moreover, such technologies already exist, and the effectiveness of which has been proven by practice. In this regard, the development of the latest technologies for the utilization of thermal emissions of excess thermal energy through endothermic reactions of hydrogen, ammonia and methane synthesis should be considered as a priority direction for the development of the world energy.

2. Methodology

The main materials used for this study were the volumes of world production and fuel consumption for the production of thermal energy. The studies were carried out for the existing reporting period from 1990-2023. It was during these years that the highest rates of increase in thermal emissions occurred. The basic data for the calculation were used on production volumes from "Enerdata: World energy and climate statistics" which is the most reliable primary source of this kind. The exception was the calculation of the volumes of thermal emissions caused by the production of electricity by nuclear power plants. In the absence of data on the use of nuclear fuel, calculations were made on the basis of the coal equivalent for the production of 1 kWh of electricity. Based on these calculations, a real opportunity was provided to trace and analyze the trend of growth in the production of the main types of energy carriers. The main purpose of the study based on production data is to determine and analyze the production and utilization of thermal emissions into the environment.

The volume of thermal emissions into the environment reflected in the calculations is no more than half of the total real volume of emissions, since the other half cannot be objectively assessed for a number of both objective and subjective reasons. First of all, because such accounting is not carried out at all. It is believed

that cleaning the environment from excess amount of waste heat as an industry, the world rocket and space, military complex and everything else is the task of nature itself. However, nature has already had its say with a significant increase in the thermal balance of the planet as a whole.

As a result of the emission of thermal energy, these emissions are propagated both by means of convection and by the transfer of thermal pressure by the means of radiation throughout the planet. These emissions are absorbed by all material components of both the atmosphere and water resources and surface layers of land without exception. All these components increase in volume, while changing their physical and chemical properties. After a dozen years, there will be no ice in the northern seas in the summer at all. Because heat emissions from the mid-latitudes of Eurasia and North America will reach the northern seas in weeks.

Therefore, in the second part of the work, an analysis of the possibilities of utilization of thermal emissions is carried out using the possibilities of utilization of thermal energy by means of endothermic synthesis reactions. These processes are well known in thermodynamics. There are workable technologies that are already working. Unfortunately, there is practically no culture of their use. But most importantly, the urgent need for their development and use is ignored. They say it's much easier to build the cleanest fusion reactor...

The primary task based on the laws of thermodynamics is to reassess the influencing factors and recognize the calorific value factor as the main polluting factor in the process of global warming. However, the most important thing is the development and implementation of both effective technologies and a thermal waste disposal program on the basis of the latest high-tech technologies.

3. Comparative Characteristics of the Impact of Thermal Emissions and Greenhouse Gases on the Environment

Thermal energy emissions into the environment and the impact of greenhouse gases on global warming processes cannot be directly compared. These are different categories of interactions in nature, belonging to different stages of the causal relationship. The difficulty lies in the fact that both processes originate from the same source and begin to act simultaneously. Being different in physical nature, they rely on the same amount of energy. Thermal pollution emissions into the environment are the quantitative value of thermal energy emissions that arise as a result of the exothermic reaction of the decay of energy carrier molecules into individual atoms or the decay reactions of the atomic nuclei themselves. (**Figure 2**) In the process of these reactions, the release of thermal energy causes an increase in the concentration of thermal energy in the environment as a whole. They penetrate into molecules and atoms of matter, which leads to their increase in volume and an increase in temperature. At the same time, the greenhouse effect is the result of the physical action of this same energy on material bodies. The change in the volume of molecules in the air leads to an increase in density, which leads to a change in their physical properties, including thermal conductivity. In

physical terms, this is a consequence of the amount of EP of energy that was released into the environment in the form of thermal emissions as a result of the exothermic reaction of the breakdown of molecules.

If you burn a certain amount of gas mixture in the engine of a moving car, is it possible to return this same gas back to the fuel tank? Under no circumstances is this possible. As a result of the exothermic combustion reaction of a methane molecule, for example, the molecule decomposed into individual components. These components, as a result of the reaction, scattered in the form of exhaust gases for hundreds of kilometres around the region. One of the main components of emissions is the waste thermal energy released as a result of the combustion of gas in the engine combustion chamber. In an integral gas molecule, this energy, before decay, was bound by the work of combining individual atoms into a single molecule. As a result of combustion, that molecule no longer exists. Having freed itself from the work of the EP of that energy, it was thrown into the environment. According to the law of conservation of energy, they did not cease to exist, but were converted into a state free from the performing of work. It is water vapor, flue gases of thermal power plants and exhaust gases of internal combustion engines that are the main components of greenhouse gases. But these components themselves are a by-product of energy combustion technologies. Being material in composition and hot on their way of dissipation, they transfer heat to adjacent components. This is the process of energy transport within some area, or the process of convective energy dissipation. However, it is not calorific.

Returning to the origins of the process, it is obvious that the primary source of both thermal energy and greenhouse gases is exothermic reactions of combustion (decay) of energy carriers. But the work of thermal emissions is a calorific effect, an additional amount of heat flows that exert additional thermal pressure on the environment. While the work of greenhouse gases is not calorific in nature. Accumulating thermal energy already available, greenhouse gases, dispersing in the environment, transfer thermal energy over considerable distances. The same work is performed by water currents of rivers and sea currents, which for some reason do not belong to this category.

Whole atomic and molecular structures are capable of carrying in their composition the EC of thermal energy over a distance of thousands of kilometres, as part of the dynamic flows of free thermal energy described in section (N). Free thermal energy, being a carrier of force, is extremely active. It penetrates into molecules of air, water or surface layers of soil, increasing their volume, thereby making them warmer. The rest of the energy, remaining in a free state, combining into energetic thermal flows, creates hurricanes and ocean currents. The more of free energy emissioni is available, the greater the consequences. It is impossible to destroy, utilize free energy. This contradicts both the cause and effect relationship and the law of conservation of energy. Therefore, it is possible to return all components to the previous bound state—the state of the methane molecule only exclusively with the help of reverse endothermic reactions of molecular synthesis. This is the

process of deactivating the force of energy by performing the work of interatomic bonds in the molecule, which excludes its destruction. This is a rule of thermodynamics. However, this is only possible under high temperatures supported by some catalysts.

There are a considerable number of technologies by which it is possible to increase the concentration of EC energy in a limited volume to values equivalent to hundreds or even thousands of degrees. In the presence of catalysts, using such technologies, it is quite possible to synthesize both methane or hydrogen molecules, ammonia and many other useful components. In the equatorial and subequatorial zones, with huge volumes of excess free heat, such technologies have become an urgent necessity. With passive expectation that somehow nature will arrange everything itself, in ten to twenty years, even staying in some regions will be possible only in protective spacesuits.

As for carbon dioxide, it is absolutely necessary for plant life. A decrease in its concentration will lead to a change in the chemical composition of the atmosphere, but will not lead to cooling. The greenhouse effect is a two-way effect. However, simple things should be remembered. If today clouds and other gases retain heat by absorption, this means that somewhere in the northern latitudes after a certain time rain will fall instead of snow, as it was before. As a result of the greenhouse effect, thermal energy is redistributed throughout the earth. Not only greenhouse gases are already involved in the process of global warming, but every atom or molecule of the environment, including the surface layers of the earth's crust and water basin. Greenhouse gases do not have a calorific effect, but are active participants in thermal energy exchange and distributors.

The calorific effect is the process of releasing elementary particles *of thermal energy as a result of the work of exothermic reactions, which operates according to the laws of cause and effect, and the law of conservation and transformation of energy.* Heat absorption is a reverse natural process, expressed by the work of endothermic synthesis reactions with the absorption of thermal energy from an external source. Waste heat is a dominant factor in the process of global warming, as well as the root cause and main factor of additional thermal pressure in the environment. For nature, this is a normal process of changing the thermal state, while for life it poses enormous threats to the conditions of its existence.

4. Purpose and Objective

A correct understanding based on a detailed, comprehensive study and appropriate interpretation of the causes and physical nature of global warming is the highest priority task of humanity in the next few decades. The primary priority is the definition and recognition of the calorific value factor as the main factor, the factor of direct action in the process of global warming.

The main factor in the process of global warming is the emissions of waste heat energy as a result of production and economic activities of the anthropogenic factor, the number of which has reached astronomical proportions. Most people as-

sociate thermal energy as a blessing, but its excess can be deadly. The need for a detailed analysis of the amount of thermal emissions in the operation of each of the energy sectors, especially nuclear ones, and thermonuclear installations classified as green, is the main priority.

Nature is self-energy sufficient. According to Rutherford's (1911) [2] theory, the nucleus of an atom is densely enshrouded by Elementary Particles (EP) of energy—electrons. How much energy is in the nucleus itself, nuclear reactions show. Moreover, the entire real volume of the interplanetary space of the Universe, including the earth, is filled to the brim with energy, at least a percentage of which is enough for the needs of humanity. The energy resources of solar radiation are unlimited, and to one degree or another are available throughout the planet, and in some regions there is a significant surplus. The production of hydrogen, methane and ammonia using solar energy in combination with the energy of thermal emissions, using artificial photosynthesis technologies are especially relevant. Thanks to these technologies, it is possible to create an effective mechanism for regulating the thermal regime of the planet. All of the above technologies are already working. Improving them and increasing efficiency is a matter of time. However, all these capabilities combined into a single complex for the processing of thermal waste will create a closed cycle of energy circulation, maintaining comfortable conditions on earth. The fight against greenhouse gases cannot give the desired positive effect. Only a comprehensive program for the regeneration of coolants using thermal emissions, carbon dioxide will lead to the desired result.

5. Criteria for Assessing the Factors of Global Warming Influence

At the heart of the assessment of the problem of global warming on earth, a philosophical rethinking of the physical nature of the factors of influence that led to this is crucial. Currently, there is no scientific justification for the causes and main factors of global warming. Greenhouse gases, being inert natural material components, are energy users. Thus, they are able to absorb or give away thermal energy, changing in volume up to a change in the state of aggregation according to the laws of thermodynamics. But they do not have a calorific effect and are not able to generate additional gigacalories of heat or kilojoules of thermal energy.

According to the current existing theory, the factor of global warming is supposedly the so-called greenhouse effect caused by the so-called greenhouse gases. But the greenhouse effect cannot be a factor in creating an additional amount of heat, because it is not heat generating in nature, that is, as such that it creates an additional amount of gigacalories of heat, or joules of thermal energy. The nature of the greenhouse effect consists in the readdressing, redirection of heat flows caused by natural factors of influence, without changing its total amount. These factors have a limited effect exclusively on certain areas of space. A striking example of this effect is the principle of operation of a refrigerator, which heats the air in the room with its thermal emissions. However, it is known that this amount of

thermal energy, due to engineering tricks, is taken from the space of the refrigerator compartment by creating two separate isolated energy bodies, namely, a room and a refrigerator chamber in the middle of the same room. As a result of volumetric transformations of thermal energy flows according to the rules of thermodynamics, the process of physical redistribution of heat flows between the spaces of the room and the refrigerator occurs. The total number of gigacalories within a fixed total volume of the room with a refrigerator inclusive remains constant. Not a single gigacalories of heat was created as a result, although the air temperature in the room increased. Obviously, the increase in temperature in the room occurred due to a decrease in the temperature in the refrigerator compartment. However, which is obvious and confirmed by the practice of operation of refrigeration equipment, a certain amount of electrical energy from an external source was spent to perform the work described above, which, according to the law of conservation of energy, is converted into thermal energy during the performance of work. The energy losses are obvious what serve as the proof of total energy amount decreasing in the proses of work preforming.

Greenhouse gases in the atmosphere do the work of the umbrella created by them. This umbrella creates a protective barrier that consists of all components of the atmosphere, including greenhouse gases, which prevents the penetration of solar radiation to the lower atmospheric layers, the surface of the earth and the water basin. This occurs due to the absorption of elementary particles of photon energy by all components of the atmosphere. The heat flux density q [W/m^2] in this case is equivalent to the light pressure created by the heat flux energy density

According to (Britannica 2025) [3] information "… to carrying energy, light transports momentum and is capable of exerting mechanical forces on objects. When an electromagnetic wave is absorbed by an object, the wave exerts a pressure (P) on the object…" that equals newton's per square metre).

$$P = I/C \tag{1}$$

where: P—light pressure, I—the wave's irradiance c—speed of light transfer.

As a result of this process, the work of the flow of thermal energy is performed to change their physical volume of each of the components of the atmosphere according to the form

$$W = P_0\left(V - V_0\right) \tag{2}$$

where: W—the work performed, V—the volume of material energetic body

This means an irreversible loss of light pressure energy, which is spent on the work of increasing the physical volume of each of the components of the atmosphere. Therefore, the higher the concentration of greenhouse gases, soot, dust and other emissions, the greater will be the energy expenditure of solar radiation to perform the work.

Therefore, the amount of energy of pressure of the light that penetrates through the protective umbrella is equivalent to,

$$E = P_1 - W = P_1 - P_0\left(V - V_0\right) \tag{3}$$

and will be reduced on the amount of the energy work performed.

$$W = P_0 \left(V - V_0 \right) \tag{4}$$

The physical essence of the process above can be demonstrated by examples from nature. During a summer thunderstorm, when the sky is covered with powerful clouds, which also belong to greenhouse gases, the air temperature can drop by ten or more degrees, caused by a sharp decrease in the pressure of solar radiation described above. After the clouds are scattered, the light pressure and air temperature, respectively, are restored to their previous values. This shows the mechanism of work of the cooling effect of greenhouse gases.

Unlike the process described above, greenhouse gases are a constantly acting component of nature, the action of which takes place on an ongoing basis throughout the history of the planet. They are the natural regulators of the planet's heat balance. An increase in their concentration in the atmosphere, the peak of which took place in the 80 s of the last centuries, although it had certain signs of global cooling, did not lead to extremely negative consequences. After all, since then, along with the stabilization of the amount of greenhouse gas emissions, the amount of thermal emissions of waste heat has occurred and is growing, the production of which and the size of emissions have acquired unprecedented proportions.

A constant external source of maintaining the thermal balance of the planet is the sun, which provides a constantly acting heat flux of light pressure of constant magnitude, which shrouds the entire planet, protecting it from the negative effects of outer space. Another constant source of heat balance is the thermal energy of the planet itself, which also radiates its own heat flux, whose pressure force acts in the opposite direction to the direction of the solar flux. Interacting with each other, these two heat flows create all the conditions for the functioning of the material gas shell of the atmosphere, which tightly envelops the body of the planet. This mechanism of interaction between two celestial bodies created a stable system for the existence and maintenance of all conditions for the existence of biological life. At the same time, humanity, having successfully mastered, at least at a mediocre level, the technological processes of exothermic reactions of the decomposition of organic energy carriers, and exothermic reactions of the decay of the atomic nucleus, created the energy industry, the capacity of which on a planetary scale in terms of heat production began to compete with the natural thermal processes on earth described above. It is this industry that has created an extremely negative impact on the environment in the form of an increase in the heat balance of the planet on a global scale, which has led to global warming.

6. General Study

The concept of the role of greenhouse gases as the main factor in the process of global warming on a planetary scale has acquired a special status in recent decades. An increase in the concentration of carbon dioxide and other components in the air basin of the earth takes place, and as such, it has some impact on the thermal

regime of the planet. But this factor cannot be the root cause of global warming. Moreover, it was the factor like that, according to scientific research, that could lead to the "Year without Summer of 1816"—the coldest year since the beginning of documenting weather observations, that is, to global cooling. The weather was extremely cold throughout Western Europe and North America. This phenomenon is being associated with the eruption of the Tambora volcano on the Indonesian island of Sumbawa in April 1815. These eruptions had built up a substantial amount of atmospheric dust, and thus temperatures fell worldwide as the airborne material blocked sunlight in the stratosphere. According to Berkeley Earth (2012) [4] analysis the Tambora eruption caused a temporary drop in the Earth's average land temperature of about one degree Celsius. *Why the problem of global warming nowadays is being associated with the emission of the same gases, soot and dust into the atmosphere?* The soot dust mixture has a two-sided effect and has significant influence on protects the planet first of all from sun warm which leads to a decrease in temperature indicators.

In 1975, Newsweek, an American weekly, published an article by Peter Gwynne, (1975) [5] in which he cited "ominous signs... global cooling" pointing out that, "the evidence was so strong that meteorologists found it "difficult to keep up with it" Which was the mistake in of both Peter himself and the authoritative publication, with such convincing evidence which had to apologize to readers ? They did not realize, and therefore did not take into account the main thing—the influence of the heat making factor on thermal processes on a planet-wide scale. Until now, its impact is poorly understood, so it remains out of the sciences as well as a public eyes. The industrial era, which started in the XVIII centuries, actually led to a significant increase in the size of the insulating layer created from greenhouse gases, dust and other polluting components, especially water vapor, which has a significant impact on heat exchange processes. All this contributed to the enhancement of the additional impact of the protective umbrella from the action of solar radiation, which certainly led to the initiation of the process of global cooling. Therefore, the global cooling predicted by Newsweek and Peter Gwinney, which was initiated by the development of the industrial age, not only took place at that time, it continues now. But in parallel with the increase in the amount of emissions of polluting components into the environment, there was an increase in the amount of production with the subsequent utilization into the environment of thermal energy, which is the main product of the industrialization process. It is the influence of this factor, which is decisive, that was not taken into account at that time and is ignored to this day. The generation and use of thermal energy, regardless of its origin, is considered is considered to be an absolute benefit. However, the energy of emissions, being a quantitative quantity, tends to accumulate in the environment around us, in all material components without exception.

Energy is a key element of interaction in the Universe. Interaction occurs on a clear intellectual and informational basis exclusively by means of force, the carrier of which is a photon. Its, photons, computer model is shown in a photograph

(Figure 1) taken by Dr. Benjamin Yuen (2024) [6] and colleagues at the University of Birmingham. The photon, being an elementary particle of energy, is quantitatively expressed by its quantum—an elementary quantitative portion. Functionally, energy is divided into bound and free one.

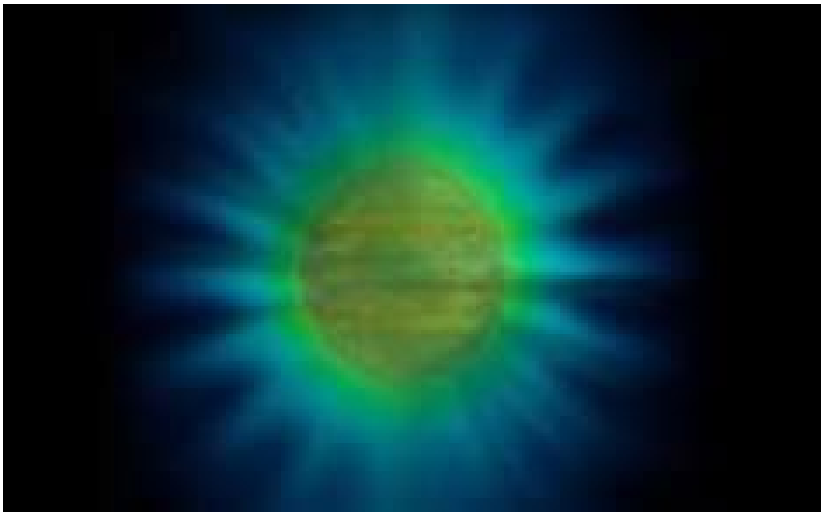

Figure 1. The shape of a single photon (https://www.eurekalert.org/news-releases/1065280).

Free energy is a part of energy, that exists in the form of a separate EPs of thermal energy—photon which is the carrier of the unit of force for the external interaction in nature. The quantitative characteristic of a photon is a quantum—one portion of the force of free thermal energy. According to the law of conservation of energy, the physical quantity of the EP—quantum can neither be created nor destroyed. It exists for good, and in the process of interaction so ever capable go from fry state to the bound one, or contrary.

The magnitude of the force as a quantitative value can always be changed by the number of quanta. The methane molecule itself, being a component of the greenhouse gas, does not emit energy. In a bound condition, in a methane molecule (Figure 2), a quantum of energy has been engaged into its work of connecting atoms within molecule for billions of years. Being engaged its force cannot freely leave the molecules bounds. In the process of exothermal reaction of combustion, the previously bound quantum becomes a free photon in the atmosphere. Therefore, the greater the number of free photons in the environment, the higher its temperature becomes

Free EP of thermal energy, combining by physical characteristics, create heat fluxes of the infrared spectrum. This flow, in turn, consisting of separate EP of the same size, tends to propagate in waves. That is, thermal energy, similar to electromagnetic energy, has a particle-wave nature. However, these two types of energy manifest themselves differently in the conditions of the earth, since they naturally have different properties and functional purposes. Therefore, the waves of thermal energy flow and electromagnetic flow manifest themselves in different ways, even with close interaction with each other.

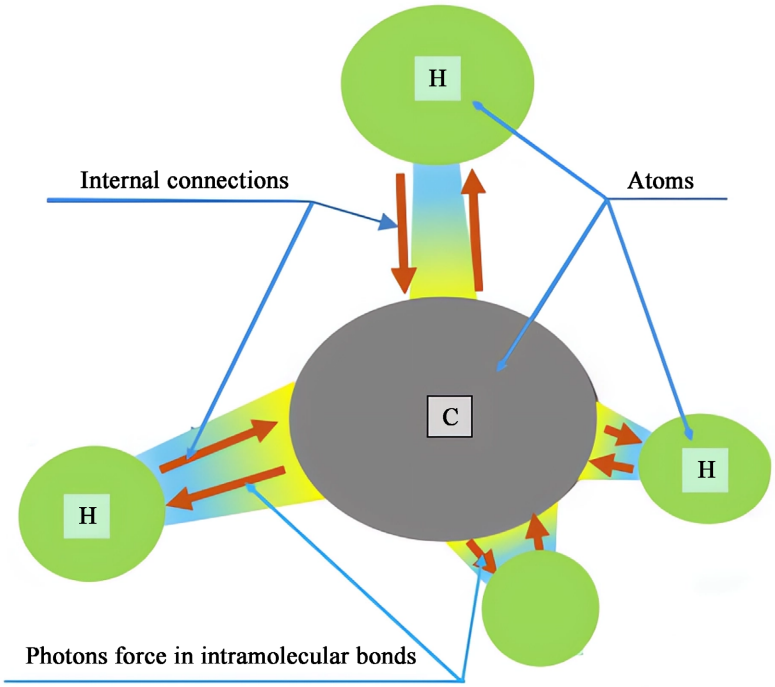

Figure 2. Illustrated diagram of intermolecular energy force bonds in a methane molecule.

6.1. Thermal Pollution Factor

Below, Table 1 provides a quantitative analysis of the world production of the main types of energy carriers and thermal energy emissions for the period 1990-2023.

The most important environmental pollutant according with the table, in all aspects is the use of coal and lignite production (2024) [7] as a source of thermal energy. Despite significant technological progress the growth rate of increasing in its emissions of thermal energy and thermal pollution of the environment in 2023 compared to 1990, is more than 60%. With an average specific heat of combustion of one kilogram of coal of 27MJ, heat emissions are calculated according to the scheme 27 MJ * 1000 kg * 4.5E+9 tons. The total amount of emissions for the period from 1990 to 2023 follows from the average annual amount of emissions for the 33 years of the study 1.69E+14 * 33 (Table 1, row 2).

Another significant factor in thermal pollution of the environment is oil refining, and especially the combustion of petroleum products. Crude-oil production (2024) [8] and emissions over the same period, which is only about 56%, their total volumes are huge. The main mass of petroleum products is used for combustion in internal combustion engines, the operating temperature of the final cooler of which is 90 degrees Celsius. This means that all the heat released during combustion is given off by the engine cooling system, and along with the exhaust gases is absorbed by the air mixture and dissipated into the atmosphere. These gases are the basis of greenhouse gases. But from this example it is obvious that the gases are a secondary product of the exothermic reaction of the decomposition

of molecules of the combustible mixture. That is, being a secondary product, they cannot be calorific, and play a secondary role in heat exchange processes, performing the work of distributing heat in the composition of combustion waste. The number of such engines has reached many hundreds of millions of units, most of which work almost every day for six to eight hours. The average specific heat of combustion of one kilogram of *crude-oil is approx.* 46 *MJ of per Kg.* 46 *MJ* * 1000 *kg* * 3.2*E+*9 *tons.*

Natural gas production (2024) [9] is considered one of the safest and most environmentally efficient energy carriers. Its combustion technologies are more efficient in terms of emissions of pollutants and greenhouse gases. However, the main product of its combustion is the thermal energy calculated by 33.5 *MJ of per* m^3 *multiplying on its quantity.*

Electricity production in nuclear power for the reporting period according to the data of the "World Nuclear Association" (2025) [10] reached record levels, which led to an increase in emissions of more than 45%, and accordingly plays a special role in thermal pollution of the environment (**Table 1**, row 7). Nuclear power is believed to have reduced the consumption of fossil fuels and sharply reduced emissions of pollutants from thermal power plants. This is true. Thermal energy is not a substance. But it is energy that causes the growth of the thermal background. To date, there are no criteria for assessing the amount of heat consumed per unit of output from this type of generation. The heat energy released from the internal energy bonds of atomic nuclei as a result of their decay is released into the environment, which is a significant increase in the scale of thermal pollution on a global scale. This is an irreversible process, so after taking into account all the factors affecting the heat balance of the planet, nuclear energy, and especially fusion energy, should not be classified as a green one. The physical nature of energy of thermal pollution does not depend on its source. It is believed that nuclear power, by reducing the consumption of fossil fuels, has dramatically reduced emissions of pollutants from thermal power plants. This is exactly the case with pollutants in the form of gases and soot. But thermal energy, being a component of material bodies, is not a substance, but a force-binding component in their composition. It is free thermal energy that causes an increase in the thermal regime. To date, there are no criteria for assessing the amount of coolants consumed to produce a unit of output of this type of generation. Thermal energy released from the internal energy bonds of atomic nuclei as a result of their decay enters the environment, which is a significant increase in the scale of thermal pollution on a global scale. The physical nature of thermal energy does not depend on its source. It is impossible to directly compare the emissions of thermal energy into the environment and the impact of greenhouse gases on global warming processes. These are different categories of interactions in nature that belong to different stages of the cause-effect relationship. Emissions of thermal energy into the environment and the impact of greenhouse gases on global warming processes cannot be directly compared. These are different categories of interactions in na-

ture that belong to different stages of the causal relationship.

In the absence of data to estimate the amount of heat emissions from a nuclear reactor, it is equated to the production of one kilowatt-hour of electricity from coal. The equivalent of 0.33 kg of coal per 1 kWh is assumed. (Table 1, row 8.) One kilogram of coal typically produces 3 kWh of electricity. The absence of greenhouse gas emissions as a result of the exothermic reaction of nuclear fission does not mean the absence of heat emissions. The water vapour heated to hundreds of degrees by the thermal energy of a nuclear reactor is used to produce electricity. As in thermal power plants, the heat used in production, undergoing the condensation process, is discharged into an artificial cooling pond, where hot water, spreading over a large area of the water reservoir, is cooled to operating parameters. From the reservoir and partly from the cooling tower, all the thermal energy of the waste steam is emitted into the atmosphere both by radiation and by convection in the form of water vapour. In technological terms, this is considered waste heat utilization. In environmental terms, this is environmental pollution by thermal emissions.

Thermal pollution emissions into the environment are a quantitative value of thermal energy emissions resulting from the exothermic reaction of the decomposition of energy carrier molecules into individual atoms or the reactions of the decay of atomic nuclei themselves. In the process of these reactions, the release of thermal energy causes an increase in the concentration of thermal energy in the environment as a whole.

Figure 3. Artificial cooling pond and cooling towers of Zaporizhzhia nuclear power station Ukraine.
https://echo24.cz/img/6309f8172b38ed625cb93bea/1910/1000?_sig=JuuoWZ1qhfxIyl72xQrhl76rpsxf6zd-CeO-buaBUkE.

If one carefully examines the photograph of the waste heat cooling system (Figure 3), you cannot see any emissions, except for a small amount of steam above the cooling towers. The impression is that the emissions are negligible. This is because thermal energy is invisible to the eyes. However, the large area of the water cooler reservoir is designed specifically to remove heat energy from the water into the environment. The total amount of thermal emissions emitted from the cooling system is equal to the amount of heat produced by the reactor. It is not steam that creates pressure in the steam generator, but thermal energy by its force, Pascal's force that creates steam pressure and rotates the turbine of the current generator. This is the point.

Each thermal or nuclear power plant in its technological chain has an artificial cooling pond, steam condensers and cooling towers (Figure 3). Their work consists in cooling the water vapor in condensers, cooling towers and in cooling water reservoirs, in order to minimize water vapor emissions into the environment. It is unknown how much waste heat energy enters the environment. But it is thermal and "green" nuclear power plants that are among the main suppliers of thermal emissions. This is the thermal energy contained partly in the free condition and partly in molecules of steam that turns into clouds, and the smoke-gas mixture that carries thermal emissions through atmospheric flows for hundreds of kilometers around.

In this context, it is also necessary to pay special attention to the extremely high level of militarization of both the world economy itself and the real hostilities that take place from time to time in different regions. It is impossible to calculate how much thermal energy is emitted by the global military complex, and especially by hostilities with the large-scale use of explosive devices, rocket engines, jet engines, etc.

But the biological chronometer reacted to the events of recent years unmistakably. For the first time in the history of some regions of Central Europe, trees in 2024 bloomed at the end of February, which is considered winter. There is no mistake of nature here. The biological chronometer indicates that the trees had received enough heat energy for the development of the foetus by the end of February 2024 temperatures of 15 - 20 Celsius in mid-January become the norm. An equally significant increase in the amount of thermal energy is released into the environment in the process of life of living organisms—that is, people, pets and poultry, the number of which has increased incredibly over the past few decades.

It is obvious that the increase in the number of living organisms on our planet in comparison with their number a hundred years ago is hundreds of billions of individuals, which, in addition to greenhouse gases as a waste product, also emit thermal energy, a considerable amount of which exerts significant pressure on the thermal regime of our planet. According to scientific studies, about 50 percent of the thermal energy produced and utilized by the body is spent on heating the body of a living organism. The remaining 50% is disposed of in other ways. Biological thermal energy is the energy of solar radiation accumulated by vegetation in the process of photosynthesis in the products we consume.

It is not possible to calculate the total amount of heat emissions as a result of

Table 1. Global production of the main energy carriers, and the thermal energy emission for the years 1990-2023.

Analysis of global production of major energy sources and thermal energy emissions for the period 1990-2023.						
Fuel type and amount of emission	**Unit**	**Quantity for 1990**	**Quantity for 2000**	**Quantity for 2010**	**Quantity for 2023**	**Total amount for the years 1990-2023 p. p**
Coal& lignite mining (2024)	Bil. t-ns	4.5	4.4	7.7	8.5	207.08
Amount of thermal energy emission	MJ	1.35E+11	1.32E+11	2.31E+11	2.55E+11	6.21E+12
Crude oil &oil products (2024)	Bil. t-ns	3.2	3.7	4.1	4.3	126.2
Amount of thermal energy emission	MJ	1.12E+14	1.29E+14	1.44E+14	1.51E+14	4.42E+15
Natural Gas (2024)	M^3	2.2E+12	2.6E+12	3.4E+12	4.3E+12	1.03E+13
Amount of thermal energy emission	MJ	7.37E+13	8.71E+13	1.14E+14	1.44E+14	3.45E+15
Electricity production by nuclear reactors	Kwh	1.8E+12	2.4E+12	2.6E+12	2.6E+12	1.2E+14
Nuclear fuel in terms of coal equivalent	Bil. t-ns	0.6	0.87	0.87	0.87	28.71
Amount of thermal energy emission	MJ	1.62E+7	2.16E+7	2.35E+7	2.35E+7	7.8E+8
Total amount of thermal energy emission	MJ	1.86E+14	2.16E+14	2.58E+14	2.95E+14	7.89E+15
Total amount of thermal energy emission	MJ	1.86E+14	2.16E+14	2.58E+14	2.95E+14	7.89E+15
Total amount of thermal energy emission for the years 1990-2023. MJ						**7.89E+15**

the vital activity of biological subjects in the absence of information and a variety of radiation sources. However, scientific research in recent decades on the impact of the vital activity of only one anthropogenic factor on the environment indicates the creation of significant heat flows and entire heat islands in areas of significant population concentration in large cities and their conglomerations. Research conducted in China where this problem has the most pronounced impact by a group of researchers Chen Y. …, Zhang N., (2008) [11] indicates that: "Anthropogenic heat strengthens the vertical movement of urban surface air flow, changing the urban heat island circulation... The degree of influence of anthropogenic heat release on local boundary layer structure depends on its importance to the surface energy budget."

Another example of significant anthropogenic heat flows of heat island is the Stockholm Experiment "Harvesting energy: body heat to warm buildings", (2011) [12], the essence of which was to use the thermal energy released by living organisms into the environment. A heat exchanger was installed in Stockholm Central Station, with the help of which the heat generated by 250 thousand passengers passing through the station during the day heats a 13-storey office building with an area of 28 thousand square meters. It is difficult to calculate the total amount of thermal energy that is emitted by living organisms into the earth's atmosphere in the process of their life. It is obvious, however, that it is the increase in the population of domestic animals and poultry that is a significant factor influencing the thermal regime of our planet.

But perhaps the most impressive are the intentions get to the bowels of the

earth, heated to thousands of degrees. That energy, they say, promises to be extremely environmentally friendly, cheap and unlimited in quantity. But where, and how to utilise of the heat extracted from underground and used heat remains unanswered. It is obvious that the essence of the problem of global warming lies not so much in the process of global warming itself, but in its one-sided interpretation contrary to the laws of thermodynamics and energy conservation. Thermal energy is a quantitative value, and has the property of accumulating from year to year, unlike greenhouse gases, the amount of which has stabilized in recent years. It is the invisibility of energy to the organs of vision, the non-obviousness of the main influencing factors and their complex interaction that pose the main danger in terms of developing a strategy and rules for handling thermal waste.

At this stage, it should be emphasized that in all the above cases, considered an additional amount of thermal energy, some of which, one or two hundred years ago, did not exist at all. How and which way the used heat energy will be utilized in such colossal quantities is the highest priority problem. The only landfills where humanity is able to throw excess thermal energy are the earth's atmosphere, the water balance of rivers, seas and oceans, as well as the surface part of the earth's land. But it is these natural habitats that are the cradle of life.

The tragedy of the situation with thermal pollution of the environment is that thermal pollution is mentally associated as a benefit, and it is not considered pollution at all. Currently, there are no more or less optimal criteria for assessing the amount of thermal energy emissions and its dominant role in the problem of global warming. The greenhouse effect does take place, but this factor has a two-way effect. It is, along with others, a secondary factor derived from thermal, or an indirect factor, which by itself is not capable of raising or lowering the temperature of the medium as such, in general. It is the heat generating factor that is decisive, it is a factor of direct action in the process of heating the environment on our planet.

6.2. Research Results

The physical nature of the thermal process consists in the change in the value of the physical volume of the body at constant pressure depending on the change in temperature according to a known formula.

$$T_1/T_2 = V_1/V_2 \tag{5}$$

In other words, free EP of energy, due to the property of acting due to the force F present in them, create pressure P due to their association, thanks to which they penetrate almost unhindered into all internal structures of atoms and molecules. The photon unit is a quantitative, volumetric, or structural unit of space, as well as a unit of temperature. The equivalent of pressure force is the equivalent of temperature and the builder of the structure of the volume of space. Thus, temperature is another measure of the work magnitude of a force of thermal energy. The power of this force is known from the operation of jet engines. Blez Pascal (2025) [13], and Issak Newton (unit, 2025) [14], were the first who introduced the con-

cept of force in science practice. The existence of pressure of force follows from the Guy-Louisac law (2024) [15].

$$P_1/T_1 = P_2/T_2 \tag{6}$$

where: T—temperature, V—volume, P—pressure $F = PS$—Pascal force.

These three above indicators, combined into the universal gas law, are versatile characteristics of the properties of the Pascal force—the universal unit of the universe.

$$PV = nRT \tag{7}$$

where P is the pressure, V—is volume, n—is the number of moles, R—is the universal gas constant and T—is the absolute temperature.

The space in nature free of energy does not exist, since it is energy the filler of space. Ambient temperature is an indicator of the concentration of thermal energy (photons) in all components, as the result of intervention or work of thermal energy. The accumulation of their amount in the molecules of the air space of the water basin and the surface layers of the earth leads to an increase in their volumes. This, in turn, leads to a change in the physical and chemical properties of all components. Heat transfer processes are slowed down precisely due to an increase in the volumetric characteristics of material components, which is consistent with the laws of thermodynamics.

An increase in the volumetric characteristics of material components leads to an increase in the thickness of the troposphere, where the main processes occur. It is this factor that creates an additional thermal insulation layer around our planet. This means that each molecule of the air mixture in the atmosphere, increasing in volume, in total leads to an increase in the thickness of the troposphere layer by hundreds of meters. An increase in the thermal background of the stratosphere due to an additional amount of heat can have even more negative consequences.

On the basis of the calculations above in **Table 1** it is possible to make a comparative analysis of the state of the atmosphere, especially the troposphere in the pre-industrial and industrial periods. Before the beginning of the industrial era, the thermal balance of the planet was maintained at a certain more or less stable level over a long period.

One of the main characteristics of the state of the thermal balance of the atmosphere is its thermal resistance and the coefficient of thermal conductivity of the air mixture layer. The thermal resistance of the air mixture R will be directly proportional to the average thickness of the troposphere air layer, and inversely proportional to the thermal conductivity coefficient.

$$R = d/\lambda \tag{8}$$

where: d—is the average thickness of the troposphere air layer, R—is the thermal resistance of the air mixture, λ—is the thermal conductivity coefficient.

In the pre-industrial era, the thermal conductivity coefficient of an air mixture was the highest. This is due to the average lowest troposphere layer thickness—d_1, as well as low content of impurities and high air transparency which led the lowest

thermal resistance of the mixture as a whole

$$\lambda_1 = d_1 / R_1 \tag{9}$$

By the mid-80s of the last century, due to uncontrollability, the amount of chemical components of emissions into the atmosphere reached its climax. There was a slight decrease in average annual temperatures. This decline occurred solely for one reason. The maximum level of air pollution by emissions led to a radical increase in the thermal resistance of the air mixture and a decrease in its thermal conductivity coefficient. The threats of global cooling, as well as acid rain and other factors, were so obvious that they prompted international organizations to start fighting to clean up the environment and severely limit all emissions. Two decades later, thanks to unprecedented measures to protect nature, quantity of waste emissions, especially into the airspace, have been sharply reduced. It was during this period, which should be emphasized, that electricity production began to massively refocus on nuclear technologies and the use of natural gas in the energy sector, which significantly reduced amount emissions of chemical components and soot. Technologies for burning coal and petroleum products have reduced the relative amount of the same emissions as well. It was from these times that a new threat to the environment began to grow—global warming. New technologies have caused and significantly accelerated another type of environmental pollution—thermal pollution.

Why has the threat of global climate cooling been replaced by a real threat of global warming? The theory of the role of the greenhouse effect caused by emissions of greenhouse gases and soot dust components in terms of increasing the heat balance of the planet has the same drawback as Gwinney's theory of global cooling. In both cases, the main property and principle of operation of the greenhouse effect are not taken into account. The greenhouse effect, which relies on the thermal conductivity of materials and their thermal resistance, is a two-way effect. It was the high concentration of the gas-and-dust mixture and water vapour emitted into the atmosphere that created an additional umbrella in the seventies, which caused cooling processes due to an increase in the thermal resistance of the air mixture. The atmosphere is a surprisingly well-balanced system that reacts surprisingly sensitively to all changes in chemical or physical composition. Based on this, special attention should be paid to the fact that the purification of the troposphere reduces its thermal resistance, which ultimately leads to an increase in temperature due to solar radiation.

Therefore, the main factor of global warming is a radical increase in the amount of thermal energy, thermal emissions combined with an increase in the heat influx of solar radiation. The amount of thermal emissions, the volume of which, according to approximate calculations, is more than 33 million cubic meters, led to an increase in the thickness of the troposphere layer Δd. This is 33 million cubic meters of these thermal corpuscles, free carriers of the force of charged particles of thermal energy, which, by heating the atmosphere, increase its physical volume.

However, the disadvantage of the above formulas is that they describe a static

process. In nature, along with static processes, dynamic processes act. When the forces of interaction balance each other, heat flows will be stationary. But in most cases, dynamic processes take place in the form of winds, storms, water currents, in which heat flows move at a distance at a certain speed. According to scientific practice, the speed of movement is the path travelled in a certain period of time. The physical essence of velocity is its dynamic force, which follows from Bernoulli's law (2025) [16] of conservation of energy.

According to this law, the total energy in the system will consist of three components—static, gravitational and dynamic:

$$P_0 + pgh + pV^2/2 = \text{const.} \tag{10}$$

The essence of the process is that the pressure indicators of the moving energy flow decrease in relation to the static pressure indicator, equivalent to an increase in the speed of movement of the flow. This is due to the fact that part of the free energy combined in a dynamic moving flow is converted into a moving dynamic force, which is expressed by the formulas described below.

These formulas describe the processes of transition of the total static pressure of the energy flow, in the absence of gravitational differences, into moving dynamic pressure by decomposition into two components.

Each of these components, being interdependent, performs separate functions.

P_0 is the value of the residual static pressure that supports the conditions for the dynamic movement of the moving flow. This pressure is created by a bound part of energy that is involved in the fulfilling of work of holding internal bonds between molecules in the experimental energy body.

$$P_d = pV^2/2 \tag{11}$$

P_d is the value of the dynamic head—the moving component of pressure.

Substituting the pressure value $P = F/S$ into the formula (11), we obtain the force of the dynamic pressure, which indicates the process of transition of the pressure force of the heat flow into the velocity of the flow movement:

$$F_d \approx p/2V^2S \tag{12}$$

Formula (12) provides a mathematical definition of dynamic force—the force of the velocity head of an energy flow with a cross area of S. This is a force that manifests itself in hurricanes, storms and currents. It follows that the physical nature of speed is a moving dynamic force in a moving energy body, created by the energy flow of free EP of thermal energy. The more energy is accumulated in the energy flows created by the free EP of energy shown in **Figure 4**, the more powerful will be hurricanes, currents, tornadoes or artificial rockets engines. This is confirmed in the physical formulas that result and follow from the above law of conservation of energy.

6.3. Ways of Dispose of a Thermal Pollutant

An effective and most advanced mechanism for the utilization of free thermal

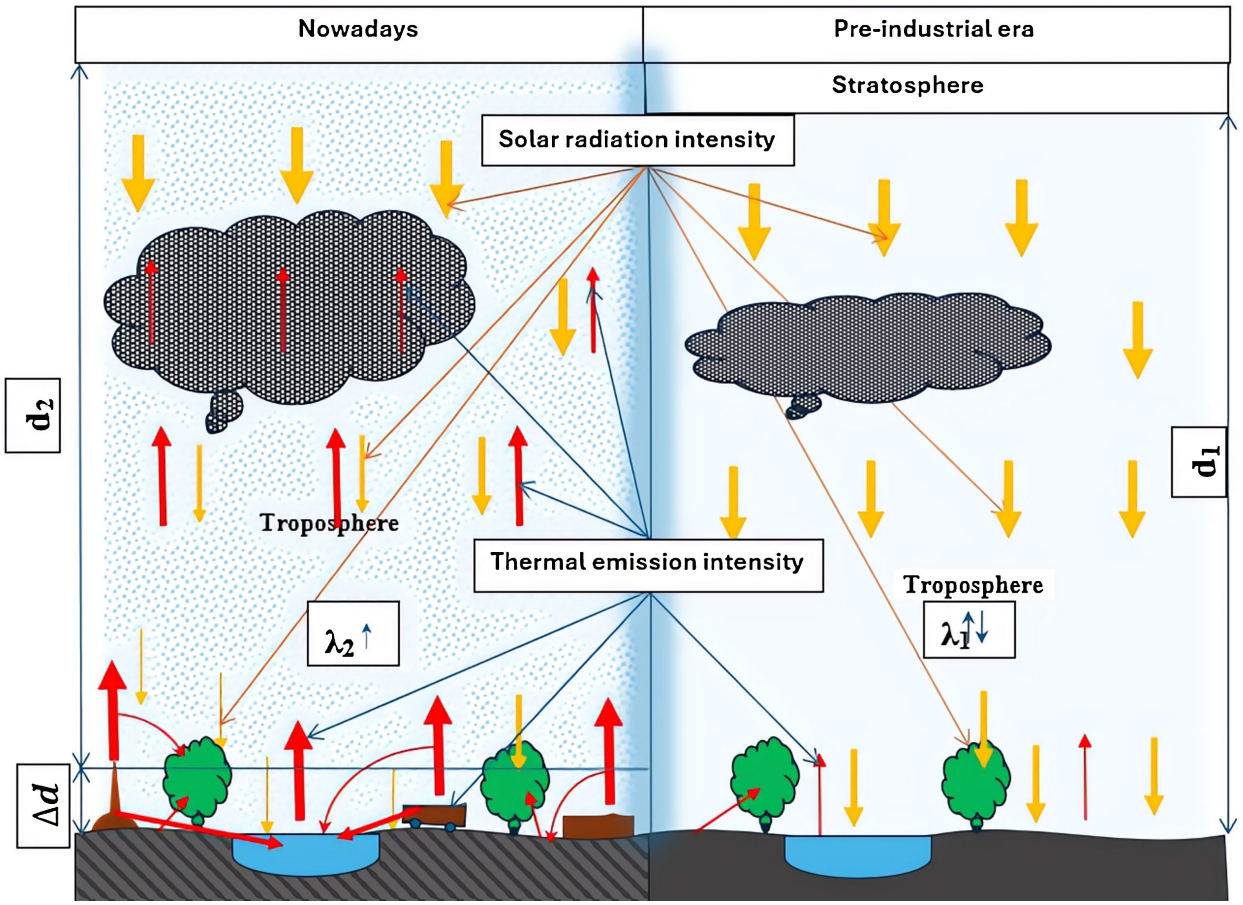

Figure 4. Illustration of the process of thermal pollution of air and environment under the influence of anthropogenic factor activities.

energy, which occurs at low temperatures, ranging from +1 to +50 degree Celsius, is the process of photosynthesis. This is a natural technological process with the absorption of free thermal energy with its consistent natural preservation in energy interatomic and intermolecular bonds, in the process of creating living organic structures. Thus, free thermal energy is decontaminated and harmful effects on the natural environment are minimized. Photosynthesis alone is currently not enough. But technologies have already been created, are working and are successfully developing, with the help of which it is possible to significantly reduce the influence of the heating factor on the thermal regime of the planet. These technologies work using and at the expense of both thermal emissions, solar radiation energy, and wind energy. Thus, a system of reversible use of energy is created, so to speak, its cycle in nature, which is fully consistent with the law of conservation.

One of these technologies is the process of thermal decomposition of water—its conversion into hydrogen and oxygen through several successive chemical reactions. The essence of the process is that it takes place at temperatures above 2500 Celsius. But with the use of technologies for binding water in a certain intermediate state with the release of oxygen and subsequent thermal decomposition, it becomes possible to reduce the temperature of such a process to 1000 Celsius. Ac-

cording to experts, the efficiency of such reactions can reach up to 50%. These technologies were created not for the utilization of thermal emissions, but for the production of hydrogen coolant—H2. The combination of two useful purposes in one technology makes this and other similar technologies extremely promising in economic terms, since the production of hydrogen energy carrier becomes more economically attractive. No less promising in this regard can be technologies for creating hydrocarbons, methane for example, the creation of which also requires a considerable amount of heat.

An example of such technology is the experimental 100-kilowatt pilot plant Hydrosol II (2012) [17] project of "Plataforma Solar de Almería" company in Spain which uses solar energy. Due to the concentration of free thermal energy in the concentrator, high temperatures of the order of 1200 Celsius are achieved, which are necessary for the breakdown of water molecules. The final products of the unit operation in a given mode are the production of free molecular oxygen O2 and hydrogen H2, as well as the utilization of excess free thermal energy released into the environment as a result of production and economic activities.

The last fact is the most important in the content of the thermal pollution utilisation. Free energy of the pollution and solar radiation has the same nature. It creates interactome's bounds in diatomic molecules of oxygen and hydrogen, due to which it is being completely deactivated. In this context, the accumulated experience and technology improvements in the field of solar energy research and development are unparalleled. The advantage of this method is that the process takes place at relatively low temperatures, and neither electrical nor any other energy is required for regeneration. Most importantly, all intermediates, except for the water composition, are regenerated precisely due to heat, which, against the background of an increase in its emissions into the environment, is in dire need of disposal. With taking the above factors into account, the cost of hydrogen fuel and other feed-in products should be significantly reduced.

Another project that deserves special attention in this context is the Green Energy Oman (GEO) (2022) [18] project in Oman, which is being developed by a consortium of world leaders in the energy sector, consisting of OQ, Inter Continental Energy, Enertech and Shell. It is already an industrial project with a capacity of 25 GW, which will use solar and wind energy to transform seawater into green hydrogen in the amount of 1.8 million tons per year, with the subsequent production of ammonia, methanol and synthetic fuels, which can be methane or its other derivatives. Particular attention should be paid to the production of ammonia, as a by-product, but very valuable for the economy and agriculture. All these processes are based on technological processes of endothermic reactions with the absorption of thermal energy in the amount of at least 15 GW, which is extremely important in this context. These are rescue technologies. Because against the background of further reduction of greenhouse gas and soot and dust emissions into the atmosphere, this will inevitably lead to an increase in the penetration of the heat-generating factor—solar radiation. Instead of the expected de-

crease in the thermal background, this, along with an increase in heat emissions, is already leading to an increase in the heat balance of the planet.

The European company "SVEVIND Energy Group" is working on the Kazakhstan megaproject "Hyrasia One" (2023) [19] with a total capacity of 20 GW, for the recovery of hydrogen and ammonia using renewable energy. It is working on the construction of an industrial electrolyser park on the coast of the Caspian Sea, which will produce up to two million tons of green hydrogen per year, with the possibility of further production of ammonia with supplies to Europe.

In the Kabuki Desert in China north-western, a grandiose project of building of the Great Solar Wall (2023) [20], solar power plant hundreds of kilometres long on desert sand with a capacity of up to 100 GW, has been launched.

Along with positive developments, these projects already pose real threats to the environment. Excessive concentration of such technologies, with the withdrawal of a huge amount of thermal energy from a limited area, will certainly lead to the movement of huge masses of thermal energy from surrounded areas, which will certainly lead to significant changes in the wind horn and their power. Capacity of more than ten 10 GW in a limited area—an unacceptable mistake. Therefore, already at the initial stage, proper planning such projects at the international level is extremely necessary.

Meanwhile a Liverpool University researchers group led by Professor L. Liu (2024) [21], simulating the complex structures and functions of natural photosynthesis, has been created a hybrid nanoreactor H–S|TBAP-α, that combines wide light absorption and efficiency to produce hydrogen, using the energy of light as the only source of energy. The main advantage of a hybrid nanoreactor is its economic benefit, which will become an additional driver in the development of artificial photosynthesis technologies.

These, and a number of other projects that companies in America, Australia and around the world are also working, are extremely relevant not only in terms of reducing greenhouse gas emissions, but more in terms of utilization of excess thermal energy emitted into the environment. The economic feasibility of this energy in comparison with coal, oil or even natural gas is also becoming more and more obvious. It is through the creation of a closed cycle of energy production, their use and utilization of thermal emissions through their regeneration that will provide conditions for the creation of an efficient energy cycle in the future. This is the way to create a system of effective impact on the environment by regulating the use of traditional energy sources and effective regeneration of thermal emissions, which will provide real opportunities and tools to stabilize the negative impacts of global warming processes on the environment. The most important thing is that all the above technologies can successfully work all over the planet.

7. Theoretical Justification of Global Warming Processes

Thermal energy of photons by its nature has no temperature. Because temperature is the work of thermal energy to change the state of a material body. Energy is a

force whose carrier is the photon. Therefore, outer space is cold. The equivalent of temperature in space is the thermal energy carrier—the photon, which is the carrier of Newton's force. Acting with the force of pressure on an air molecule in the atmosphere, the photon increases the volume of the molecule, which is subjectively felt by living organisms as thermal comfort. The energy carriers of photons are not able to go beyond the Earth's gravity. The entire amount of the Earth's energy is its property. Since energy is quantitative, it consists of its elementary particles—carriers of the force of interaction. The amount of energy carriers is equivalent to the number of elementary particles of matter that are carriers of mass. It should be clearly understood that energy serves the processes of interaction of its own mass, which in this case belongs to the material body of the Earth. Even one elementary particle of energy cannot leave the mass of the earth on its own, because for this the atom or molecule to which the EP belongs must be given a dynamic force, accelerating it to the second cosmic velocity. Nature does not have the ability to independently violate the law of conservation of energy and other laws of nature. That is, no material object, including the EP, is capable of independently accelerating to such a speed. In the entire history of the earth's existence, not a single molecule has left it, with the exception of rocket aircraft that, with the help of powerful engines, gave the aircraft such dynamics.

The speed of movement of EP of energy flows in nature is several meters per second, which is equivalent to the speed of energy flows in winds or sea currents. At the same time, the speed of transmission of interaction transmitted by means of pressure created by the action of force is 300,000 km/s. In the process of transmission of interaction, the movement of elementary particles is not assumed at all, since these are independent processes from each other. In the process of transmission, information is transmitted, so to speak, from hand to hand. It is thanks to the transmission of information at such a speed that the force mechanism of interaction is extremely sensitive and effective. For communication with other spatial systems, information is transmitted using the force of pressure. The work on the received information is performed by completely different photons—carriers of force, that is, those that are in the interaction zone. For example, to change the parameters of the movement of a spacecraft at a distance of millions of kilometers from the Earth, the transmitter transmits a command in the form of force pulses. These pulses are transmitted from hand to hand to the receiver by elementary particles of energy that completely fill the space of open space. In that area of space, there is no free energy in nature for the aircraft to perform maneuvering movements. All the energy that is there is involved in the work of a local interaction. To perform movements, the spacecraft starts engines that will provide the spacecraft with dynamic force to perform the movement. It follows from this that energy cannot move contrary to the laws of nature. The amount of energy is equivalent to the amount of mass. Therefore, all the EP of thermal energy that belong to the atoms of the earth's mass cannot leave it.

The thermal regime of a planet within the solar system is maintained by several

means. The main means is the planet's own energy, which is maintained by means of the force pressure created by the energy body of the planet itself. The value of these parameters is constant in its overall energy balance, and provides the absolute majority of the thermal energy necessary to ensure the vital capacity of biological life. However, the thermal level of energy self-sufficiency is clearly insufficient and is about −30 or −40 degrees Celsius. This is the temperature that the mass of the Earth can provide during the polar night in the polar regions, with the almost complete absence of the influence of solar radiation. Obviously, this level is insufficient to ensure the vital activity of biological life.

Another part of the heat balance is provided by solar radiation, which reaches the Earth's surface every day for a certain time and in a certain amount. With the help of solar radiation, due to the action of the pressure force of the thermal flux of photons, zones of increased thermal pressure are created, which creates an additional balance of thermal influence on the Earth's environment. It is known from thermodynamics that the higher the pressure in the system, the higher the temperature of the environment. The flux of solar radiation exerts additional thermal pressure on the existing natural system of the Earth. The pressure of light is a well-known phenomenon, predicted by J. Maxwell (1873) [22], and experimentally proven by E. Nicols in1903 and P. Lebedev (1901) [23].

This phenomenon causes an increase in the concentration of light photons in the near-surface layers of the atmosphere, which leads to an increase in the light pressure in this area. An increase in the light pressure, in turn, leads to an increase in the ambient temperature. If a certain area of the atmosphere is covered with clouds, a dust curtain or smoke, then in this case only a part of the photons reached the ground, since a certain part of the photons was absorbed by the curtain of clouds, smoke or dust. That is, the pressure of the light energy will be lower. Therefore, accordingly, the air temperature under the curtain of clouds or smoke will always be lower. The thicker the water, smoke or dust clouds, the lower the temperature between the curtain and the earth's surface.

This was the case for tens, perhaps hundreds of thousands of years. The Earth's body, with the help of the additional amount of light pressure from solar radiation, ensured a certain level of thermal pressure in the near-surface layers of the atmosphere, which was more or less constant over a long period. This provided a relatively comfortable thermal regime for life processes that had successfully adapted to such conditions.

But everything has changed in the last hundred years. These changes have become especially noticeable in recent decades. As a result of the intensive development of the industrial and economic complex, there has been a need to use additional energy resources in the form of thermal energy. The volumes of extraction and combustion of energy carriers, as well as the production of thermal energy, have reached enormous volumes. Thermal energy is obtained in the process of exothermic reactions of combustion of organic energy carriers or nuclear reactions in nuclear reactors. In general, heat is associated with most people as a ben-

efit, since heat itself creates comfortable living conditions. However, excess heat in the environment causes significant discomfort in living conditions, and even poses a threat to health and even life. Excess heat is created by the global industrial and economic complex as a result of thermal emissions of heat used up by technological processes.

Over the past decades, the excess of thermal energy in the environment has become increasingly noticeable, which has gradually grown into a global threat—the threat of global warming. But despite the growing threats, thermal pollution of the environment caused by excess emissions of thermal energy is not considered pollution as such. The main factor of global warming is considered to be emissions into the atmosphere of the so-called greenhouse gases. However, it is known and established by scientific research that greenhouse gases do not have a calorific effect, therefore they cannot be the main factor, the root cause of global warming. Moreover, by creating a protective screen, they prevent the penetration of part of the thermal energy into the lower layers of the atmosphere, which leads to a significant decrease in thermal pressure (light pressure) and, accordingly, the temperature in the environment. Each gigacalorie of heat from thermal pollution, according to the laws of thermodynamics, is an increase in the physical volume of some atom, which is accompanied by an increase in its temperature. Therefore, the increase in the value of thermal pressure in the near-surface layers of the atmosphere, which is equivalent to an increase in the effective average daily temperatures in the environment, occurs exclusively due to thermal pollution of the environment caused by mass emissions of waste thermal energy. Waste thermal energy is real gigacalories of heat in the form of EP of thermal energy that penetrate into the atomic-molecular structures of the atmosphere, water basin and surface layers of the earth's crust. This leads to their increase in volume and is expressed in an increase in their temperature. Therefore, the absolute majority of gigacalories of thermal emissions are distributed in the troposphere without even reaching the stratosphere. The absorption of heat by material components is a natural process of energy accumulation, which must not only be known about, but also taken into account. For nature, an increase in temperature by several degrees is the accumulation of energy that nature actively uses in interaction processes. Moreover, this is its own energy that was released in the process of exothermic reactions. Nature will not send this energy into outer space, but will use it for itself. For example, the body of the sun is heated to 6000 K near the surface. But it is in no hurry to send its heat into outer space, but uses it for its own needs. Humanity, in turn, already has experience in creating high-power energy accumulators using purely terrestrial components for this.

The only way to combat this potential man-made disaster of nearest future is to bind free thermal energy by means of endothermic reactions of molecular synthesis of complex organic compounds, ammonia, which can be successfully used both in the energy sector and in industrial production. Nowadays, there are a sufficient number of effective technologies based on endothermic reactions of mo-

lecular synthesis, which, when using catalysts, have an excellent economic effect. The amount of excess heat is extremely large, especially in the equatorial and subequatorial zones. The use of such technologies around the world will make it possible not only to minimize the harmful effects of thermal waste, but also to create the basis of energy circulation technologies in nature. It is energy circulation technologies that are the technologies of the future and should be the driving force and one of the main components of the philosophy of the future.

8. Uncertainties in Heat Emission Inventories and Atmospheric Mixing

The total uncertainty of greenhouse gas inventory emissions varies significantly from in studies of most countries. The difference in uncertainty, which reaches up to 20% is primarily due to different subjective assessments of the uncertainty of emissions in general. However, the most striking is the absence of even mention of thermal pollution. Therefore, the uncertainty of the trend of thermal pollution is, as practice shows, a complex issue, since there is no clear definition of the pollution factors themselves. Without recognition of the thermal emission factor, a comprehensive assessment of the causes and consequences of global warming is impossible. The absence of consideration of thermal pollution of the environment by thermal emissions does not at all mean the absence of the problem as such. Therefore, the uncertainty of the trend will remain high compared to the emission reduction targets set in the Kyoto Protocol without taking into account the impact of the waste thermal energy emission factor.

Analysis of the concept of measurement uncertainty as a scientific theory shows the ambiguity of its implementation in terms of the correct interpretation of the physical nature of the phenomenon as such, as well as the corresponding applied metrology used in our time. Particularly relevant is the determination, first of all, of the multifaceted nature of natural processes. Limiting the assessment of the state of the environment exclusively to greenhouse gas emissions into the atmosphere indicates the imperfection of the assessment system. The methodology for assessing the state of thermal pollution of the environment should be carried out separately for both the atmosphere and the surface of the Earth's land, surface waters and waters of the seas and oceans. Currently, there is an objective process of the beginning of the subjective awareness of the threat of climate change on a global scale. For the very beginning, it is extremely necessary to scientifically substantiate the physical nature of the phenomenon, from the point of view of cause and effect relationship, thermodynamic processes and the law of conservation of energy. If greenhouse gases are emitted into the atmosphere during engine operation, it should be noted that with the hot gases, thermal energy is also emitted and radiated into the atmosphere, causing an increase in the thermal regime of the planet, since energy is the main factor in all thermal processes without exception.

There is a theory according to which excess thermal energy should be radiated into outer space. However, thermal energy is a component of matter. Together

they belong to the mass of the earth. The maximum speed of thermal emission flows near the earth's surface is several meters per second. *In order for a material component to overcome the earth's gravity, it must be given a dynamic force equivalent to the second cosmic velocity. How can the energy of thermal emissions accelerate to such a speed?* But the truth is that if planet Earth gave off energy so freely, it would be left without it altogether. Even a small comet does not lose its tail that stretches for millions of kilometres, because its entire tail belongs to it. Nature acts exclusively with its inherent intelligence according to its own laws, which are called the laws of nature. It is obvious that in order to eliminate the existing shortcomings of the implementation of the concept of estimating measurement uncertainty, it is necessary to develop comprehensive methods for assessing all influence factors based on their scientific interpretation.

9. Future Research

This is a short conceptual study that highlights the latest principles of environmental assessment and monitoring. The threat of global warming is an extraordinary challenge for the further development of the energy complex of the planet as a whole. It applies equally to Antarctica and tropical regions. Greenhouse gases pose a certain threat to the environment. However, it is known that a cold room cannot be warmed with gases, as neither gases nor water vapour are carriers of calorific value.

Unfortunately, mankind perceives the environment as a garbage can into which you can dump as much heat energy as you want. However, thermal energy is a quantitative quantity, the excess of which in the environment poses a deadly threat to all living things. Nuclear technologies are not green. The amount of heat emissions per unit of production is perhaps the highest of all. The expediency of using fusion technologies is absurd.

It is impossible to stop the work of the energy complex and transportation. But we can reduce the amount of heat emissions. It is extremely important to improve and disseminate technologies for utilizing the amount of heat emissions, using technologies for the synthesis of coolants and ammonia, as well as other technologies. The development of heat energy utilization models based on artificial intelligence can provide real opportunities to optimize the processes of monitoring, evaluation and sustainable development of artificial energy circulation technologies in the heat and power complex. The necessary technologies and even some experiences are available for this purpose. Recognition of the heat-generating factor as the main factor of global warming and a correct assessment of the threat is extremely important....

10. Conclusions

Thus, the heat-generating factor, which causes emissions of thermal energy into the environment as a result of production and economic activity of mankind, is the main factor of global warming. In this regard, the primary task is the official

recognition at the international level of the heat-generating factor in the form of thermal energy emissions as a factor of thermal pollution of the environment.

Thermal pollution of the environment is an extremely big threat to the safe existence of life. This threat is many orders of magnitude higher than all other threats, even the threat of a nuclear conflict, which can be resolved at the political level. However, reducing the use of energy resources is impossible. It is necessary to reassess the technologies of their production by creating technologies of natural energy cycle for the effective use of waste heat energy in combination with solar energy. It is quite possible to return the excess free energy to a bound state, by artificial synthesis of molecular hydrogen, methane or the same ammonia for industrial use. To introduce new nuclear energy capacities exclusively in combination with capacities of utilisation of thermal waste, without geographical reference. The increase in energy regeneration capacities should exceed the increase in heat emissions. The obvious advantages of such technologies are the availability of an almost unlimited amount of resources, and real opportunities for their use. The amount of excess heat in some regions, such as the Middle East, the equatorial regions of the planet, the Sahara deserts and other desert regions, can be used to produce the most environmentally friendly energy carrier—hydrogen. At the same time, whether the thermal energy of the sun or from other sources will be used does not matter. The task is to create conditions for the energy cycle by reducing the volume of free thermal energy in the environment on a permanent basis. The Earth is energetically self-sufficient. Provided that it is used correctly, its resource will be enough forever. But the culture of handling energy resources, the rules of use, require radical changes.

The greenhouse effect and the emissions of additional free heat energy are radically different in nature. It is a two-way factor that reliably protects the life of the planet as a whole. Greenhouse gases and water vapour, creating a protective shield, reduce the thermal pressure of solar radiation energy on the surface layers of the earth's surface and low-lying layers of the atmosphere, which should create a cooling effect. But this does not happen because the amount of thermal energy emissions into the environment and its calorific value effect in recent decades significantly exceeds the cooling effect caused by greenhouse gases. It is impossible to destroy energy. The Earth, as a single energy body with powerful forces of energetic centripetal and centrifugal interaction, will not allow any single joule of energy to leave it. The plumes of the atmosphere of comets millions of kilometres long, which for billions of years have not detached from the physical body, serve as vivid evidence of the equivalence of the amount of mass and the amount of energy. So, the energy that belongs to the mass of the earth cannot leave the earth energetic body. The thermal regime of the Earth depends on the amount of its own free thermal energy, and its amount, which is maintained by the force pressure of the heat flow from the sun. The strength of the heat flux and its influence on the thermal regime of the earth is variable and depends on the time of year, that is, on the location of the planet in its own orbit. With a constant level of en-

ergy activity, the Sun provides a stable number of photons from year to year, unchanged for many thousands of years. The Earth's own thermal regime with a constant mass has also been stable for millennia. However, in just a few decades, humans have disrupted this balance due to heat emissions generated by exothermic reactions resulting from the decomposition of molecular structures of energy carriers. This has led to the release of EP of thermal energy being involved into the interatomic bonds of energy carrier molecules and the structure of atomic nuclei. From year to year, as a result of irresponsible production and economic activities, the amount of emissions irrevocably increases by accumulation in the environment. It is possible to restore at least partially the thermal regime of the planet only due to endothermic reactions of molecular synthesis with absorption and conversion into a bound state of the corresponding amount of heat.

The use of endothermic molecular synthesis reaction technologies with the absorption of excess heat does not pose any threats to the state of the environment and the viability of the planet as a whole.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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