

Climate changes influence to Renewable Energies and Proposal for its Reversal with the Direct Renewable Energy Application

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ABSTRACT

The mechanism of climate is explained with the mathematical model created by Prof. Dr. Milutin Milankovic that is used to calculate and point the appearance of the Ice Ages. Changes in electromagnetic radiation that we receive, with the quantification and classification of renewable energies has been presented. To reverse climate changes, methodology and application are proposed with Direct Renewable Energy Application.

Keywords: Climate changes, direct renewable energy application, nondestructive mining, Milutin Milankovic.

1. INTRODUCTION

Climate is one of the most complex manifestations of the interaction between energy and matter that we know. It connects and describes everything around us, including ourselves. Excessive emission of matter into the atmosphere in form of particles and gasses disrupts the transmission of solar energy and changes its structure, manifested as climate changes. The quantity of matter on our planet is constant. What will become out of basic elements available, depend on the energy that is applied to it.

We are very rich with energy, but understand and employ only a fraction of it. In search of further development, we have to look for solutions that are out of implemented technical borders.

The focus of our search has to be on:

- Broadening knowledge about our surroundings,
- Understanding the natural mechanisms to prevent further disturbances and apply the most suitable corrective measures,
- Identify the new ways to utilize energy.

The paper is organized as follows: in section 2 we explain Climate mechanism with Quantum Physics, section 3 presents the climate mathematical model and quantifies available electromagnetic energy, section 4 proposes measures to reverse climate changes, and ends with section 5 - Conclusion.

2. CLIMATE AND QUANTUM PHYSICS

2.1 Atom – photon interaction

Everything we know is composed of atoms [1], characterized by mass and electrical charge. The differences between the atoms are formed by the quantity and structural arrangement of electrons, protons, and neutrons. A stable atom is electrically neutral, indicating that the proton's positive charges are balanced by the negative charges from the electrons.

In terms of energy, stable atoms can be in a state of minimum potential energy for which the lowest electron-energy states have been filled and all the higher energy states are empty (ground state), or excited, which contains electrons whose energy is higher than that of an unoccupied state. An excited atom is unstable and will return to its ground state by losing energy or electrons when it is classified as an ion.

A molecule consists of several atoms bound together, which has more possible energy states than a single atom. Since every electron in a molecule must occupy a different state, many molecules have sets of very closely spaced energy levels. Electrons involved in chemical bonding occupy a high-energy band called the valence band that is shared among neighboring atoms.

Atom changes its internal energy state by the emission or absorption of a photon during radiative transitions, which can occur only if the photon energy is equal to the difference in energies between the two

states. A photon is a collection of elementary light particles (oscillations), characterized by the frequency and the wavelength, differing by the quantity of energy that the wave is carrying. A highly excited atom can return to its ground state directly or by a sequence of transitions between energy levels. Collisions with other atoms, ions, or charged particles can also change an atom's internal energy.

Radiative transitions between atomic energy levels produce spectra characteristic of the atoms of each element. Similarly, the spectra of molecules are made up of groups of many lines close together, giving the appearance of bands.

Interaction of Earth's matter with the electromagnetic radiation of the Sun produces excitation or ionization [2], as follows:

- Infrared cause electron vibrations and heat emission,
- Visible and near-ultraviolet brings the energy that stimulates chemical reactions (molecule creations) by interacting with outer (valence) electrons, and
- Larger photons – Gamma, X, and the rest of Ultra Violet - are breaking the molecular bonds and destroying biological and other molecules [3].

From an emission point of view, we can look at atoms as a nano-transformer of electromagnetic radiation, since the released photons mostly have no characteristics of the energy received.

2.2. The matter–radiation interaction

It will not be productive to analyze all available photon interactions with the atoms and molecules of our planet. However, we can identify three distinct mixed mediums that have almost unified responses: atmosphere, land, and water.

2.2.1 Gas – Atmosphere

It has no fixed volume or shape, low density, can be compressed, is moving at high speeds, and has moderate thermal expansion.

The atmosphere absorbs and reflects more than half of the total Sun's radiation [4] and it protects us from harmful gamma, X, and the majority of UV rays, leaving us with the rest of the electromagnetic spectrum that we know and feel as Sun's energy. Its energy-storing capabilities are significant and worth exploring further. This is a very dynamic, three-dimensional chemical plant [5] exchanging energy in and from all directions.

2.2.2. Solids - Earth's surface

Solids have definite shape and volume, are of very rigid, ordered structures, and in fixed positions - high density. Atoms are held tightly together, incompressible, and move through vibration only.

Sun's energy that reaches sea level consists of about 6% ultraviolet, 52% is visible and 42% is infrared radiation [6], changing with the altitude. Once received by the planet's surface, the Sun's radiation is partially absorbed and reflected in the atmosphere and space, with very little penetration.

2.2.3. Liquids – Water

Water has a definite volume, atoms are not widely separated, has high density and small compressibility, but no definite shape. Atoms slide over one another (able to flow) and have small thermal expansion.

Infrared radiation [7] is absorbed by water accumulated in oceans, lakes, and rivers, releasing heat and molecules to the atmosphere during a process called evaporation, as an invisible gas. Water reserves represent significant energy and materials storing medium that should be more explored and exploited.

Gravity and temperature variations create and control the hydrological cycle [8] and provide us with many aspects of water-related energies. When below 0° C, the water turns into ice and snow, which have very strong radiation reflection properties [9].

3. THE CLIMATE MATHEMATICAL MODEL

To explain the energy transformation mechanism, we will use a mathematical model of Prof. Milutin Milankovic [10]. The simulation is built out of the following independent sections:

- Defining space objects within the Solar system and their mutual interaction by applying Newton's laws.
- Establishing quantity of the Sun's energy received by introducing Solar constant for flat plain and then spreading it over a curved surface, changing beam angle due to the planet rotation in time.
- Solar radiation is reaching Earth's surface as direct, diffuse solar radiation and radiated molecular energy reduced by the energy returned to space and absorbed by the atmosphere, limiting end product radiation to Infrared, Visible, and near-Ultraviolet spectrum. As per Stefan-Boltzmann's law, Earth will radiate the Infrared spectrum, indicating that energy exchange should be looked at

from a heat perspective and available energy through the heat budget.

Cyclic changes of orbital properties called precession, obliquity, and eccentricity cause variations in Earth's surface temperatures that pointed to low energy periods during the last 600 millennia called the Ice Ages.

To simplify the model, Milankovic used as a constant the Sun's energy influx (Solar constant), the shape of Earth, characteristics of the atmosphere, and its content. Findings were confirmed on land as a part of the research of Köppen and Wegener, and later with the ocean bed analysis [11].

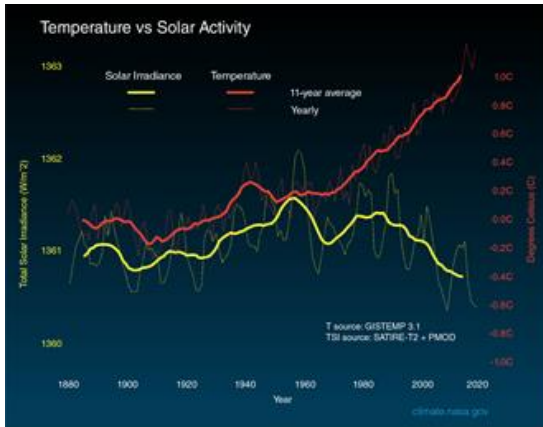


Fig. 1: Change of Solar constant and average Earth temperature over last 140 years - (SOURCE:<https://climate.nasa.gov/causes/>)

3.1. The climate/energy quantification

The energy of electromagnetic radiation directed to Earth is substantial, about 173.5 petawatts($10^{15}W$) [12]! This value is a part of the second step of the mathematical model and is calculated for a flat surface – which means that this energy is constantly pointed to the ever-moving sunny side of our planet. Since Earth is curved, this energy is not evenly dispersed, so the calculation presented is an estimate of energy values received at the whole surface.

As shown in Figure 1, the value of the Solar Constant [13] is variable, but the temperature is rising more rapidly, showing that the temperature increase is not related to changes in incoming solar radiation.

Helmholtz energy conservation law [14] is quoting that "Energy cannot be created or destroyed; it can only be changed from one form to another", so all incoming and outgoing radiated energy has to balance, as per Figure 2. Direct radiation is 30% reflected, while secondary radiation of the atmosphere out of 19% is 30% emitted back to space, reducing the total by

another 6,4%, clouds for about 0.4% and surface 10.3%, bringing total to 47.1% reduction, and leaving us with about $91.7 \times 10^{15}W$ of electromagnetic energy.

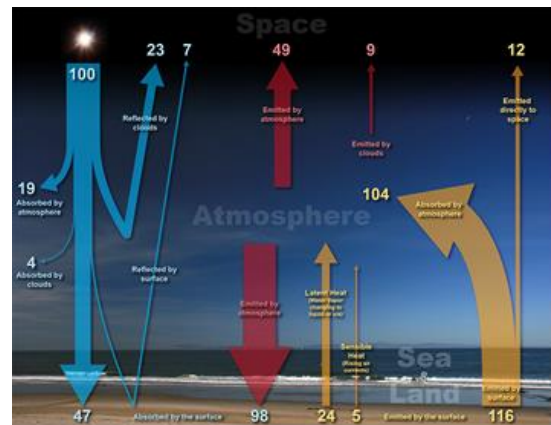


Fig. 2: Incoming energy from the Sun balanced with outgoing energy from the Earth (SOURCE: <https://www.weather.gov/jetstream/energy>)

Every change needs energy. Since our energy influx gradually varies, the matter tends to spread it evenly and absorbs photons that make atoms vibrate, bond with others, and emit it further by the rules of Quantum Physics. We observe it as many individual events that together create a mechanism of naturally connected changes that we call climate. Based on the information presented, the following energy conversions have been identified and their values estimated within the quantities established for the sea level:

- Infrared – 42% - ($38.5 \times 10^{15}W$) provides us with a sufficient temperature. When above $0^{\circ}C$, water flows with gravity and induces hydro energy [15], wave [16], sea currents [17], tidal [18], metabolic energy exchange [19], and wind [20]. Thermal energy is harvested with OTEC (Ocean Thermal Energy Conversion) [21] and CSP (Concentrated Solar Power) [22] power generation technologies,
- Visible and near Ultra Violet - 52+6% - ($53.18 \times 10^{15}W$) converts into chemical energy of sugar with photosynthesis [23] that feeds all living organisms, what was a base for creation of the fossil fuels [24], and provide electricity from PV (Photovoltaic) technologies [25].

I am sure that, with a better understanding of energy, we will be able to identify more new sources.

It is very important to mention that somewhere between specific cosmic energies, forces, and matter, unique conditions have allowed the development of self-sustainable energy conversion that we call life. The obvious increase in temperature means that the energy

composition that we receive is changing to more intense infrared radiation that life has to adjust to and will influence the composition of renewable energies.

4. CLIMATE CHANGES CORRECTIVE MEASURES

4.1. Problem definition

The atmosphere is the gaseous space of about 4.2 billion km³ [26], consisting of Nitrogen (78.08%), [27] Oxygen (20.95%), leaving less than 2% for all other gasses, including Green House Gasses content and particles emission, that is changing climate. The most dominant, CO₂ concentration is 415 ppm [28] and growing. Our target is a two-stage process: to stop emission to a maximum of 500/550 ppm [29], before starting to decline. The strategy to achieve this is, according to common knowledge, available resources, and obstacles - blurred and uncertain. Our further development requires more drinkable water, raw materials, and energy which are generating all this negative influence. Technologies used to utilize them have to change and, this time, be very carefully chosen.

4.1.1. Water

The total volume of our planet's hydrosphere is 1.39 billion km³ [30]. Water is a polar molecule, which easily dissolves and absorbs other polar molecules and ions. Under the influence of heat, it changes its aggregate states from frozen to liquid and gaseous, constantly circulating and collecting, carrying, and accumulating various substances and energies to its reservoirs. Evaporation and freezing separate the water from the solution and are natural ways for purification. The hydrologic cycle has been systematically cleaning the air, soil, and water, enabling our emergence and existence, but we have turned it into a way of spreading it by excessively emitting bio and chemical pollution in all directions. The only good thing that the KOVID 19 pandemic has shown us is that with the reduction of industry and transport activities [31], the hydrological cycle and gravity can quickly cleanse the atmosphere, returning that emitted material to the surface. With the additional release of sewage, industrial pollution, rubbish dumps to the rivers, underground water reserves, and the seas, water pollution represents an even greater direct danger to life than the air.

Water filtration has become so complex that it cannot be solved by conventional ways of water purification. Further, everything indicates that clean air

and with it climate changes reversal will be achieved only with the elimination of pollution sources and intensive water filtration.

4.1.2. Recycling and nondestructive digging

The development of our civilization requires increasing amounts of organic and inorganic raw materials. Plants and animals have their place primarily in the food processing industry, but also in clothing, furniture, construction, etc. Mining is a branch of industry that provides metals and non-metals by excavating natural deposits. In parallel to natural reserves, we accumulated huge amounts of rubbish that can be a source of raw materials by recycling. The transformation of our way of living and thinking requires the change of existing technologies to those that are closed, which means that there is no emission of energy and matter from the process (is reduced to a minimum), so the influence to the environment. When it comes to mining, non-destructive digging should be applied. The proposed methodology is based on ore treatment with water or air under pressure that is vacuumed into further processing. Water dissolved ore further treatment can be applied to the remnants of the water filtration process.

The freshwater carries naturally eroded materials, but also plastic, dissolved ions, and metals, asbestos, organics, detergents, pesticides, etc. which all can be recycled and put to good use. Salty water, in addition to those already mentioned, contains ions of Sodium, Magnesium, Calcium, Potassium, Strontium, then Chlorides, Sulfates, Bicarbonates, Bromides, Borates, Florides, volcanic and other deposits, and many more. Water can absorb gasses and already contains a larger amount of CO₂ than the atmosphere, so it is considered as a possible storage space and a source.

4.1.3. Energy

Fossil fuels will be replaced with a variety of energies that are mostly "renewed" by nature.

Electricity has been developed from the need to supply one universal form able to change into many other forms of energy. To be part of a single distribution system, all available energies have to be converted into it by various technologies, following certain parameters. There are many obstacles and complications to the functioning of this system, especially after renewable energy sources were introduced to the grid.

For the sake of better understanding, we will compare the fossil with the renewable fuels – both on the way to be converted into a shape that we need. Fossil fuels are static, adjustable, preserved concentrates, while renewables are dynamic, extremely variable, shapeless, without the possibility of intensity adjustment. While fossil fuels are distributed in a controlled manner, renewable fuels are all around us. Fossil fuels and their products cost money, while renewable can be used raw and are free before it is integrated into the electricity grid. In addition to the four cosmic forces identified by Quantum Physics as basic - gravitational, electromagnetic, strong, and weak nuclear - many conversions came out of it performing various natural processes. While the group of fossil fuels is fairly small, consisting of oil, coal, and natural gas, where energy is released only by combustion, converted into heat and light, and then to mechanical and electrical energy, renewables offer a wide range of forces and methods for utilizing energy. This diversity imposes a different approach to understanding and treating energies. Instead of following a variety of transformations that generate losses in form of matter and energy, some renewable energy manifestations can be applied directly, without transformation or treatment, to certain processes. The advantages of this possibility are obvious: we use free and clean energy in the form available and in the place where needed, avoiding the construction of expensive powerplants, infrastructure, and losses during accumulation, transformation, transmission, and control. By applying engineering tools and knowledge, we only connect the technology with the energy source and create conditions so that nature can do the work for us with its energy. This way of thinking imposes that we distinguish the two parallel energy distribution systems at our disposal. One that we create and control in the form of an electrical network, and the other, incomparably larger, natural. We only recently realized its potential, learning how to use it, and believe that the direct use of renewable energy is one of the possible essential steps forward, providing new opportunities in self-sustainability, clean technologies, energy utilization wireless energy transmission, and with it - quality of life.

4.4. *The proposed solution*

Based on the information presented and personal vision of how technologies of the future should be designed and performed, the technology called: "Direct renewable energy application to hybrid water filtration

and electricity generation facility" is under development. The main features are:

- Water filtration and electricity generation were merged and powered directly with renewable energy in a single, closed process, providing us with clear water, clean electricity, and raw materials from fresh and salty waters,
- Depending on the needs and arrangement, it can work permanently, or in cycles.
- The facility has great environmental protecting potential since the unwanted water constituents are removed and reused. Further processing of these materials is a part of a separate process, using nondestructive mining methodology. Salty water facilities, by their huge capacities, can contribute greatly to the elimination of fossil fuels, water supply to the deserts, exploitation of submerged mines, air purification, soil, and water.
- By using free energy to run the process, products will generate higher profit than those currently available, as well as construction and maintenance.
- The plant is a convenient solution to remote/isolated communities situated on land or on/in the water, as well as for coastal megacities since it provides all basic needs for existence.

The invention is protected under patent application П-2020/0933, dated 03.08.2020.

5. CONCLUSION

The in-depth multidisciplinary analysis presented has indicated that changes in the Sun's energy that we receive are influencing the structure of renewable energies of our planet, and the existence of life forms in general. In parallel to methodology development for atmosphere purification, it is of great importance to reduce/eliminate the emission of energy and matter from our life supporting technologies and look at the problem wider. Currently available technologies just partially provide solutions, relying totally on electricity.

The proposed solution, unlike others, is powered with natural energy directly and generates electricity, filters water, and extracts raw materials for the industry, out of one closed process. It has a mega potential since it can use all water reserves including the oceans, eliminating energy transformations, pollutants from water, has a potential to substantially reduce dependence on electricity, fossil fuels consumption in general, with it the source of air pollution, and introduce an entirely new philosophy on energy and the matter interaction that we desperately

need. By stopping gasses and particle emissions to the atmosphere, the hydrologic cycle with direct renewable energy will cleanse the air, accumulating all in water. If applying this technology and knowledge presented systematically, we will be able to hold all pollution from air, land, and water from further spreading with unheard financial benefits, returning nature to flourish without any disturbances to our progress. I strongly believe that this solution is a way out of our problems, a better future for our kids.

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