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The geoengineering project “Sunny Rain” will adapt humanity to climate change and slow down climate warming, as well as solve a number of other problems

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Abstract: The geo-engineering project "Sunny Rain" will be able to: produce water on an industrial scale for the Arava and Negev and other agricultural areas; be the basis for measures to adapt humanity to the predicted temperature rise; and solve a number of other problems. It is shown that adaptation measures related to the use of geo-engineering project to reduce CO_2 emissions into the atmosphere are ineffective. It is proposed to hold a conference "Water and Climate" (similar to the Paris Climate Change Conference 2015), where the negotiators commit to follow the recommendations of the geoengineering project "Sunny Rain", then the amount of greenhouse gases and air temperature above the Earth will be significantly reduced, which will lead to a slowdown in climate warming.

Keywords: Geo-engineering project to reduce atmospheric CO_2 emissions**,** Geoengineering project "Sunny Rain", Invention, Adaptation anticipatory measures to climate change, Greenhouse gases, Air temperature.

1. Introduction

The main purpose of this article is to formulate measures to save humanity by adapting people to climate change and slowing down climate warming, as well as solving other problems. The author of this article has filed an invention with the Patent Office that solves various pro- problems, including protection against climate change, based on "Sunny Rain" [11]. (Section 1 discusses a number of organizational issues in implementing the proposed invention). Section 2 discusses geo-engineering projects aimed at combating climate change, discusses their shortcomings and formulates the proposed geo-engineering project "Solar Rain". Section 3 formulates adaptation anticipatory measures related to climate change, using the geoengineering project "Sunny Rain". In Section 4, based on the results obtained, a proposal is made to hold a conference "Water and Climate" (similar to the Paris Climate Change Conference 2015), at which the negotiators commit to follow the recommendations of the geoengineering project "Sunny Rain", which will lead to a significant reduction in the amount of greenhouse gases and air temperature above the Earth, meaning a slowdown in climate warming. Annex 1 provides additional information:“On the need for industrial quantities of water.”

2. Main results of the invention and organisational issues of implementation of the proposed invention.

I have written an application for invention [11]: METHOD AND SYSTEM FOR OBTAINING INDUSTRIAL QUANTITIES OF WATER FROM ATMOSPHERE AND ITS APPLICATIONS FOR VARIOUS PURPOSES. The United States Patent and Trademark Office has received a patent application for my invention containing the following identifying information: PATENT APPLICATION NUMBER: 18/445,190 PRIORITY DATE: 17.05.2023.

If the invention is realised, it will help mankind to obtain water on an industrial scale and protect it from climate change, as well as solve a number of other problems A1) to A5).

A1) Obtaining water on an industrial scale. Irrigation of agricultural land, Arava, Negev is possible (see Annex1).

A2) Our "Sunny Rain" technology can offer mankind adaptive pre-emptive measures against climate change (Secttion 3,4).

A3) Our new "Sunny Rain" technology can be further utilised to fight fires.

A4) Our "Sunny Rain" technology can be used to clean the air over cities such as Delhi, Beijing, Tel Aviv.

A5) Our new "Sunny Rain technology can also be used to eliminate unwanted dense fog at airports. American airlines lose many billions due to fog that disrupts flight schedules.

If desired, an international patent application can be filed based on a US patent covering 150 countries. The invention would form the basis for the creation of a new company, Sunny Rain International (SRI). It is proposed to manufacture the drone in the Israeli branch of SRI (Israel Aircraft Industries - Malat Division is responsible for the creation of the drone), organise the production of the necessary infrastructure and equip the drone with it.

If desired, an international patent application can be filed based on a US patent covering 150 countries. Negotiators at the 2015 Paris Climate Change Conference committed to low greenhouse gas emission development strategies. There needs to be an analogue climate change conference where negotiators commit to joining SRI and following the recommendations of a new geo-engineering strategy.

I am convinced that the owners of SRI, who will offer adaptive, proactive measures against climate change and save humanity from water scarcity, will make significant profits and deserve the gratitude of humanity!

3. Climate change and analysis of the geo-engineering project to reduce CO_2 emissions into the atmosphere

The UN is implementing a geo-engineering project to reduce CO2 emissions into the atmosphere in accordance with the Paris Agreement on Climate Change, which regulates measures to reduce carbon dioxide in the atmosphere, adopted in Paris on 12 December 2015. This agreement aims to substantially reduce global greenhouse gas emissions and limit the rise in global temperatures this century to 2 degrees Celsius, and to find means to further limit this rise to 1.5 degrees Celsius. To date, 194 parties have joined the Paris Agreement [3]. Thus, the "CO_2 reduction" strategy is pro-value and new ideas are needed. In addition to geoengineering projects aimed at reducing CO2 emissions into the atmosphere, other geoengineering projects are being developed [4]: space small-mass scattering systems to change the albedo of the planet, space mirrors, spraying seawater thousands of metres into the air to form stratocumulus clouds that deflect sunlight; installing sunscreens or mirrors in space to reflect sunlight; injecting particles into space to block sunlight.

The National Academy of Sciences, Engineering and Medicine recommends that the federal government invest up to $200 million over the next five years to develop a national programme of climate engineering research aimed at cooling the planet [5]. An analysis of geoengineering projects proposed by the National Academy of Sciences shows that these projects, even if refined into finished inventions, should have significantly less effectiveness in solving the problem of air cooling over cities than our proposed invention.

Comments on the geo-engineering project to reduce CO_2 emissions into the atmosphere are as follows: 1) Human activities (anthropogenic factors) are not the only source of carbon dioxide in the Earth's atmosphere. 2) Volcanic emissions and biosphere activities are also sources of CO2. 3) The second greenhouse gas me-tan is formed in the swamps, lakes of Siberia. The greenhouse activity of CH4 is stronger than that of CO_2 over a 20-year interval - by a factor of 84. 4) The third greenhouse gas, water vapour, is the main greenhouse gas responsible for more than 60% of the greenhouse effect for the Earth. The increase in the Earth's temperature is associated with magmatic processes in the Earth (traces of destructive volcanoes have been found in glaciers in Antarctica, Greenland [6] and the eruption of the Hunga 2022 volcano [15]) and the greenhouse effect. The increase in the Earth's temperature increases the evaporability and total concentration of water vapour in the atmosphere at almost constant relative humidity, which, in turn, enhances the greenhouse effect. 1) Report published on 16.07.2023: From 3 to 10 July 2023, the world experienced the hottest week in the history of observations [1]. The World Meteorological Organisation has stated that extreme weather is likely to become "the new normal" [2]. UN Secretary-General António Guterres said that " climate change is getting out of control". According to meteorologists, July 2023 has officially become the hottest month ever recorded by humans on Earth. “If we don't take action on climate change now, these extremal weather events will be just the tip of the iceberg. And, indeed, the iceberg is melting fast," Guterres said."[22]. This is the beginning of a climate catastrophe! Why? Director of the Centre for History of Physics Dr SPENCER R. WEART formulated: "If greenhouse gas emissions continue to rise, scientists will not be able to rule out the occurrence of 'tipping points' for irreversible and catastrophic climate change. The end could be a radically hotter planet, which would seriously jeopardise 'health, economy, political stability .... and, ultimately, the planet's suitability for human life." [12].

2) One of the reasons for this situation is that the UN is following an ineffective geo-engineering project to reduce CO_2 emissions into the atmosphere

Table 1:Greenhouse gases in atmosphere

Gas	Formula	Contribution (%)
Carbon dioxide	CO_2	9—26 %
Methane	CH_4	4—9 %
Ozone	O_3	3—7 %
Water vapour	H_2O	60%

3) Table 1 presents the contribution of greenhouse gases to the atmosphere. Note that water vapour (H_2O) is the main greenhouse gas, responsible for more than

60% of the Earth's greenhouse effect. The contribution (%) of CO2 is only 9-26%, which is much less than the contribution (%) of H_2O!

Let us consider the main provisions of the geo-engineering project to reduce CO_2 emissions into the atmosphere:

1) Human activities (anthropogenic factor) are not the only source of CO_2 in the Earth's atmosphere.

2) Volcanic emissions and biosphere activities are also sources of CO_2.

3) A third greenhouse gas, water vapour, is the main greenhouse gas responsible for more than 60% of the Earth's greenhouse effect (see Table 1).

Thus, even if we completely reduce CO_2 emissions, water vapour concentrations will increase due to rising temperatures. Moreover, the higher the temperature, the more H_2O evaporates, and the total amount of greenhouse gases only increases, which in turn leads to higher temperatures.

Thus, the situation is not only getting worse, but will continue to get worse! The geo-engineering project to reduce CO_2 emissions into the atmosphere has been completely ineffective and a new geo-engineering project is required!

We propose a new geo-engineering project "Sunny Rain", which significantly reduces the greenhouse effect and results in additional air cooling due to water evaporation, which will adapt humanity to climate change! The benefits of the geo-engineering project "Solar Rain" are that artificial "Sunny Rain" captures all greenhouse gases in the atmosphere (H_2O water vapour), CO_2, CH_4, O_3, including capturing aerosols over cities, and also leads to additional air cooling due to the powerful mechanism of water evaporation. Thus, the "Sunny Rain geoengineering project is fundamentally more effective than the geoengineering project in reducing human-derived CO_2. Considering that both geoengineering projects are based on different ideas, they can be initially used together to achieve greater efficiency, as it makes no sense for mankind to first pollute the atmosphere with CO_2, CH_4, O_3 and then clean it from greenhouse gases contributed by man and nature.

4. Adaptation anticipatory measures related to climate change, using the geoengineering project "Sunny Rain"

Mankind, forced to adapt to living in an extremely hot climate, must develop some proactive measures. This section presents some proactive measures using the geoengineering project "Sunny Rain" for one of the cities.

4.1 It has been reported that Be'er Sheva will be the first Israeli city to experience extreme temperatures in autumn 2023. According to reports by firefighters and meteorologists, the number of large fires is expected to increase in the coming decades, posing an "immediate danger to people and property". According to a report prepared by Dr Amir Givati, the number of dry and windy days with high fire danger will increase from 70 to 80 per year as early as 2030. By 2060, it will increase to 90 days per year. Virtually no government agency has a "preparedness plan" [9].

Proposed proactive measures:

-The Be'er Sheva Municipality should order " Sunny Rain" for the autumn of 2023 in the required quantity (similar to turning on the air conditioner in a flat). " Sunny Rain" will clean the air of greenhouse gases and create precipitation that cools the air to an acceptable temperature (recall that when 1 g of water evaporates at 20°C, 2.45 kJ is absorbed). These measures will create the possibility of a comfortable life for the residents of Be'er Sheva.

Our new " Sunny Rain" technology can be used to fight fires in the future.

4.2 Global warming will make Israel's climate drier. According to the Ministry of Environment and the Meteorological Service, precipitation in Israel has decreased by 3.4 per cent over the past 30 years. This trend will continue and increase in the coming decades. Annual precipitation is decreasing. By the end of the 21st century, warming is expected to lead to a significant reduction in crop yields worldwide - at least 15 per cent. Israel, which imports most of its food, has not yet developed a plan to prepare for such a situation [9].

Proposed proactive measures:

- The Sunny Rain Geoengineering Project is proposing and developing ways to produce water on an industrial scale. Water production is possible in the Arava and Negev where there are almost no clouds. More water would increase agricultural production by more than 15 per cent.

4.3 Israel is once again experiencing a water shortage. Forecasters predict that the autumn of 2022 will be the driest in 50 years. Water shortages are particularly acute in the northern regions, around Lake Kinneret and in the basin of rivers, streams and dried-up canals

that fill the lake. There, rainfall is less than half of the average, and in some places even up to one-third, such as in the Golan 35-45 years ago [10].

Proposed proactive measures:

- The Sunny Rain geoengineering project will allow the Kinneret to be filled and new reservoirs to be created throughout Israel.

4. Conclusions

Our proposed invention is a breakthrough invention because of the following reasons:

(A) we are not using the traditional concept and we are able to work in Negev, Arava all the time.

(B) The efficiency of operation is very high - it is estimated that one drone can provide 1.94million m^3 of water (when relative humidity æ=70%) in 18 hours. In a year it is estimated that one drone can provide 712.3 million m^3 of water. Thus, one drone will irrigate Israel 129.52% of the 550 million m3 per year that Israel's agriculture consumes per year.

(C) Condensation nuclei are completely environmentally friendly.

(D) If invention will be realized, it will help mankind to obtain water on an industrial scale and will protect it from climate change, as well as well as will solve a number of other problems A2) – A5).

A1) Obtaining water on an industrial scale. Irrigation of agricultural lands Arava, Negev is possible (see Annex1).

A2) Our technology "Sunny Rain" can propose to mankind adaptation anticipatory measures from climate change (see Section 3,4).

A3) Our new technology "Sunny Rain" can further be used to fight fires.

A4) Our "Sunny Rain" technology can be used to clean the air over cities, such as over Tel-Aviv, Beijing, Delhi.

A5) Our new Sunny Rain technology can also be used to eliminate unwanted dense fog at airports. US airlines lose many billions due to fog disrupting flight schedules.

In Section 4, we described the proposed readiness anticipatory measures for one town. A climate change conference (similar to the 2015 Paris Climate Change Conference) should be held where negotiators commit to following the recommendations of the new geoengineering project “Sunny Rain”. Then the amount of greenhouse gases and air temperature over the Earth will be significantly reduced, which will be beneficial to all countries of the world.

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Annex 1: On the need for industrial quantities of water

A1.1. At present, the main source of fresh water is water from rivers, lakes, artesian wells and desalinated sea water. The amount of water currently in the atmosphere is equal to 14 thousand km^3, while in all river beds only 1.2 thousand km^3. Every year, 577 thousand km^3 of water evaporates from the surface of the land and oceans, and the same amount falls as precipitation. River annual runoff accounts for only 7 per cent of total precipitation. Thus, the main source of fresh water - water in the atmosphere - is unutilized. Fresh water is not only used to meet the personal needs of the population: it is only 8% of the total water consumption. Agriculture (about 60 per cent) and industry (about 30 per cent) account for the lion's share.The problem of limited access to fresh water is faced not only by the inhabitants of the Middle East and North Africa, but also by the inhabitants of Central Asia, India, Korea, Australia, Romania, Moldova, Hungary and even the northern parts of the USA. The desert occupies 60 per cent of Israel's territory.

A1.2. Prehistory of methods of condensation of moisture from the air.

Even in ancient times - up to 3000 years ago, they knew how to produce fresh water by natural condensation of water vapours from the air: in ancient times in the Crimea to provide water for the city of Theodosia were used mounds of crushed stone in the form of a pyramid, which were built on a low mountain plateau. Due to the difference between day and night temperature of the surrounding air, condensation formed on the surface of the rubble and flowed into a special container. From there, it flowed naturally through a chute to the water collection facilities. During the dry summer months, enough water was condensed to supply 80,000 inhabitants. A good example of the ability of ancient engineers to utilise natural effects is the Great Silk Road. One of its main advantages was wells. Along the way at a distance of 12-15 km from each other were created wells, each of which had water in quantities sufficient to water a caravan of 150-200 camels. In such a well clean water was extracted directly from atmospheric air. Due to the design of the well, desert air was "pumped" through its volume by thousands of cubic meters per day and each cubic meter of water was taken away from almost the entire mass of water contained in it.

A1.3. **Modern Constructs.**

(1)The Watergen product line is based on the unique patented GENius heat transfer technology. Patent No. US 9140396. US 9976817 Up to 400 litres per day from a single unit

(2) Rain by compulsion

The United Arab Emirates receives rainfall only a few days a year, but scientists here are actively using cloud seeding techniques to increase the frequency and volume of rain. Aircraft deliver chemicals, such as hygroscopic salt nanoparticles, into the clouds. They attract water droplets inside the cloud, which combine to form large ones that fall to the ground under their weight. Forecaster Ahmad Al Kamali says it is important to organise the seeding carefully. "Timing is very important, pilots need to be at the location of the cloud before it reaches the stage of maturity," he explains. - Pilots need to get to the clouds vertical development, then seeding will be successful." Sufian Farrah, a meteorologist and cloud seeding expert, gives the following figures. "Rainfall enhancement operations, and intervention in clouds through reagent seeding can increase rainfall by 10 to 15 per cent. Under favourable conditions, the figure can also reach 25%. It is wrong to think that we are talking about small numbers. Let's take into account that each cubic kilometre holds about 500 tonnes of water. In an hour of work with cloud seeding in the UAE, we can remove

up to 100,000 cubic metres of water from the clouds".[13]

Note: The above invention has several disadvantages:

1. It is proposed to use clouds as a source of water (see Annex5. The traditional concept of obtaining water from the atmosphere). But clouds are very rare in the Negev, Arava, UAE, so it is impossible to plan to use clouds in these areas.

2. If we try to use clouds as a source of water in areas where clouds are present, we find out that the efficiency is low (increase in rainfall by only about 15%). In Israel, there was a unit with 10 aircraft that operated in winter over Kinneret and in Northern Israel. Due to low cost effectiveness, the unit was closed down.

3. Introducing condensation nuclei from non-environmental reagents into clouds is banned sooner or later. For example, the world's most popular reagent silver iodide published in 2016. Article [14], classified the ecotoxicological risk from silver iodide, the world's most popular reagent, as high at concentrations that mimic those that can be expected after cumulative accumulation of the reagent when deposited with water. Cloud seeding from silver iodide is environmentally unsafe and should be used with caution and it is advisable to avoid regular use on the same area. The hygroscopic salt nanoparticles used in UAE are not environmentally friendly.

A1.4. **Proposed geo-engineering project "Sunny Rain".**

At the Water Conference in New York on 23 April 2023, the UN Secretary General stated that a plan to overcome the global water crisis is urgently needed, and the "Sunny Rain" technology will help to solve the acute global problem and protect humanity from water shortage and hunger: the total volume of water VS(18h) discharged in 18 h from one drone is VS(18h)=1.94million m^3 of water.

Total volume of water discharged in 1 year from drone is VS(1year)= 712.3 million m^3 of water. Thus, one drone will irrigate Israel 129.52% of the 550 million m3 per year that Israel's agriculture consumes per year.[11] The proposed artificial rain, called "Sunny Rain", can be utilised to bring rain to the semi-deserts and deserts (Arava and Negev) in the absence of clouds [11]

A1.5. There is currently a great need for technology "Sunny Rain" in all world. At the Water Conference in New York on 23 April 2023, the UN Secretary General stated that a plan is urgently needed to deal with the global water crisis, and technology " Sunny Rain" would help solve a pressing global problem and protect humanity from hunger. For example, Iraq recently appealed to the world community to help preserve the shallowing Tigris and Euphrates rivers. In Uzbekistan, the Syr-Darya and Amu-Darya rivers and Lake Aral have disappeared. Shallowing rivers are also occurring in Europe (the nuclear power plant was stopped due to the shoaling of the cooling river in France). Global fresh water demand will outstrip supply by 40% by 2030, say experts. The world is facing an imminent water crisis, with demand expected to outstrip the supply of fresh water by 40% by the end of this decade, experts have said on the eve of a crucial UN water summit. More than half of the world's population, or 4.2 billion people, lack access to safely organized sanitation and hygiene services (WHO/UNICEF, 2019).

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