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A "Global Environmental, Social, and Governance "Long-Term Sustain-Ability Approach, to Harness 'Climate Change' Mechanisms

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Abstract

Geology is the science of how the Earth functions have evolved and can contribute to our understanding of the climate system, and how it responds to the addition of carbon dioxide (CO_2) to the atmosphere and oceans[1]. The gravitational concept embraces the intricate relationships between the Sun's energy flow and the planet's ecosystems, such as photosynthesis, geothermal activity, biogeochemical cycles, and hydrological cycles. It provides an approach towards a better understanding of these mechanisms in a sustainable manner. Understanding carbon distribution and movement is vital for comprehending the broader biogeochemical cycles that govern Earth's environment. These cycles involve the movement and transformation of chemical elements and compounds between living organisms, mediated through geological and chemical processes. The impacts of anthropogenic activities on these systems underscore the necessity for meticulous analysis and thoughtful action to preserve ecosystem integrity, in an Environmental / Social / Governance approach.

Keywords: Climate Change, Environmental Mechanisms, Biogeochemical Processes, Elastic Fluid Boundary Conditions, Proven Project Management Solutions

Introduction

Climate change[2] is a part of 'Earth's environmental balance mechanisms' and based on 'Man's Laws of Science'. Human activities are now impacting all major ecosystems and the biogeochemical systems they influence, necessitating careful identification and analysis. 'Earth Systems Science', encompassing geology and chemistry, pertains in part to 'the movement and transformation of chemical elements[3] and compounds between living organisms', known as the biogeochemical cycle, which involves 'fluxian'[4] boundary conditions through anthropological boundaries, and land matter conditions.

This balancing environmental mechanism appears to be unique to our small planet, Earth. The mechanism is critical to life. Without the 'partial opacity' of Earth's atmosphere to infrared radiation, the planet's surface would reach sub-zero temperatures at night when cut-off from sunlight. Life forms would cease, as on the Moon.

Carbon dioxide is one of the primary contributors to the 'greenhouse effect', which traps heat within Earth's atmosphere. Its sources are varied, ranging from natural processes such as volcanic eruptions and respiration to human activities including the burning of fossil fuels and deforestation. The environmental impact of CO_2 extends beyond the temperature rise condition; it influences ocean acidification, disrupts ecosystems, and accelerates biodiversity loss.

Global Environmental, Social, and Governance (ESG) regulations require professional organizations to report openly in a transparent way to embrace energy use, carbon emissions, and climate-related financial risks under an early co-ordinated framework.

Sun's Light Energy

Light Energy enters or leaves the Earth's environmental system through electromagnetic radiations. It radiates from the surface by 'infrared radiation', 'visible light' and 'ultraviolet radiation, and this temperature is controlled by the planet's environmental mechanisms[5].

When Earth's surface absorbs as much energy as it releases the planet's energy budgets are balanced, and the temperature remains stable.[6]

Physical properties[7] of some gases tend to be opaque to infrared radiations. When present in the atmosphere, they reflect a proportion of gases emitted from earth back towards the surface, this causes an imbalance, warming the earth's surface, both day and night, and prevents some of the heat absorbed from the Sun from being released back to space.

Atmospheric and Ocean Currents

Atmosphere[8]

The energy from the Sun heats the atmospheric matter, which rotates in unison with Earth and is responsible for creating the circulation of all 'elastic fluidised'[9] matter. The curvature of Earth creates the variation of heat between the equator and the poles, producing two atmospheric (Hadley) cells; less dense air at the equator rises creating low pressure, and cold dense air falls at the poles.

The environmental mechanism on earth allows the air to rise at the equator and flow to the 30^{O} latitudes, creating three cells for each hemisphere, (Hadley / Ferrel / Polar)[10]. Ref: Appendices- Atmospheric Prevailing Winds.

The earth 's rotation on a tilted axis produces perpetual motion of the oceans in the southern hemisphere, while there is a greater land mass in the northern hemisphere. This creates complex global weather patterns across the six cells around the planet. The dynamic of combined mechanism switching between temperature and pressure, drives the movement of air masses, influencing weather patterns and climatic zones. The atmospheric mechanisms also facilitate the distribution of moisture, shaping ecosystems and weather systems across the planet, including atmospheric pollution[11].

Anthropology defines the Coriolis effect resulting from earth's rotation, as the pattern of deflection taken by objects not firmly connected to the ground, as they travel long distances around earth, and which is responsible for many of the critical weather patterns. At the equator a maximum distance is travelled in one day, approaching 1,000 miles[12], while the distance travelled at the poles, approaches zero travel. In the northern hemisphere the motion is to the east, while in the southern hemisphere it is to the west. The build-up of trade winds and cyclones are examples of the Coriolis effect.

Oceans[13]

The Sun's energy is directly responsible for the stratification process to earth's oceans, which creates the environmental mechanisms to produce layers of transition boundaries through the ocean's depths, vital for all marine life, as we know and understand it. In Lakes and small bodies of water, the warm surface layer is less dense and forms a thermocline boundary condition, above which is the 'epilimnion', with the cooler water disconnected below as the 'hypolimnion'.

In the Oceans, the thermocline's environmental mechanism is influenced by the depth of the ocean's waves, which creates a mixing process boundary layer condition in the upper 100 metres. The temperature decreases rapidly from the mixed upper layer of the ocean (epipelagic zone) to the much colder deep water in the thermocline (mesopelagic zone).

Below the thermocline are colder, denser waters, and below 3,300 feet to a depth of about 13,100 feet, the water temperature remains constant[14]. The deeper (stratified) layers contain colder, denser bottom waters where rare and unknown life forms exist[15].

The relationship between depth and temperature is significant, as different marine species thrive in specific layers. This environmental mechanism may be a key area for studying the origins of life.

Creatures who live at great depths do not have air in their bodies such as the swim bladders found in fish that live in more shallow waters. Without air in their bodies, the pressure problem is solved. Fish, crab, octopus, worms, limpets and clams are just some of the creatures found in the depths of the oceans.[16]

Despite its central role in the global climate, the Southern Ocean circulation is still one of the least understood ocean circulation systems of the planet[17].

The term El Niño (Spanish for 'the Christ Child') refers to a warming of the ocean surface, or above-average sea surface temperatures, in the central and eastern tropical Pacific Ocean[18]. The low-level surface winds, which normally blow from east to west along the equator ("easterly winds"), instead weaken or, in some cases, start blowing the other direction (from west to east or "westerly winds"). El Niño recurs irregularly, from two years to a decade, and no two events are exactly alike. El Niño events can disrupt normal weather patterns in the United States and globally.

The structural intricacies of ocean layers are further influenced by nutrient cycles and biological activity. In the epipelagic zone, where sunlight penetrates most effectively, primary producers like phytoplankton perform photosynthesis, generating the foundation of oceanic food webs. These upper layers are teeming with life due to nutrient upwelling, a phenomenon driven by ocean currents and the movement of tectonic plates. As depth increases, the availability of sunlight diminishes, creating stark contrasts in biodiversity and energy dynamics between the epipelagic and mesopelagic zones.

The mesopelagic zone, often referred to as the "twilight zone," hosts unique adaptations among its inhabitants, such as bioluminescence, and specialized feeding mechanisms, enabling survival in low-light conditions.

The mesopelagic zone also serves as a transitional environment where carbon and nutrients are sequestered, playing a critical role in the global carbon cycle.
For example, phytoplankton, which are tiny plant-like organisms, flourish in sunlight-rich zones, whereas, zooplankton, which feast on these nutrients, occupy various depths depending on the time of day.

The 'high seas' is in perpetual motion, embracing vast kinetic energy resources[19], sufficient for long-term sustainability, and the Oceans are earth's 'natural Energy Storage reservoirs' for all mankind. Man's Science is now sufficiently developed to co-ordinate and organise a Structure Plan embracing the additional methodologies[20] to harness all earth's natural energy resources, based on 'Fluid Mechanics' concepts.

Carbon Management Process

The UK brought into force the Climate Change Act (CCA) 2008[21], setting targets for a reduction of Greenhouse Gases (GHG) by 2050, to provide for a system of carbon budgeting[22] for the purpose of limiting GHG from the atmosphere. The Act established 'The Committee on Climate Change'[23] (CCC) to assist in 'carbon management', to monitor, advise and report with 'carbon budgets' and on 'monitoring / control' procedures towards the '2050 target'[24] for reduction of GHG.

Under general ancillary powers[25] the committee may exercise its duties to take action to ensure it carries out its functions under the guidance of National Authorities and the Secretary of State. The British Standards Institute (BSI) immediately embraced their Specification for 'Carbon management in Infrastructure' [26] in May 2016, to enable accuracy, transparency, consistency, relevance and completeness of carbon management and GHG emissions quantification.

The awareness of a pending global climate emergency triggered the BSI Group to develop their Specification in 2023 to Carbon Management in buildings and Infrastructure to embrace the built environment[27]. The scope of PAS 2080 is about Carbon management as part of wider climate change mitigation; it is not about wider environmental or sustainability issues, it is important that the carbon implications of climate adaptation, biodiversity net gain and nature-based solutions are fully taken into account, in the delivery, operation, use and end of life[28] of products and programmes of work. Failing to evaluate them together might risk conflict and unintended consequences across the processes and systems.[29]

The methodology control procedures for the 'practitioner' calculating Infrastructure GHG emissions, is covered in the 2016 specification,[30] which were responsible for over half of the UK's GHG consumption in 2010 emissions, a total: 981 million tonnes Mt CO_2e[31] and a programmed emissions target of 178 Mt CO_2e in 2050. CO_2e is a unit for comparing the radiative forcing of a greenhouse gas to carbon dioxide[32] and is calculated using the mass of a given GHG, multiplied by its global warming potential. 'GWP' which is the factor describing the radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of CO_2 over a given period[33].

In 2019 the Climate Change Committee (CCC) Report, 'Net Zero[34] - The UK's contribution to stopping global warming'[35], led to the (CCC) committing the UK Government by law to reduce greenhouse gas emissions by at least 100% of 1990 levels by 2050, which relates to 'net zero'.

The 'Office of Environmental Protection'[36] (OEP) is responsible for Environmental governance, including environmental targets, environmental improvement plans, environmental monitoring, and importantly to embrace compliance with the five main environmental principles[37] recorded in the Environment Act 2021.

The augmented specification of PAS 2080 (2023), embraces more fully for projects, the programme of works[38], leadership[39], life cycle[40] and nature-based solutions[41]. It also embraces the principles for Decarbonization[42] and Integrating carbon management into the decision making[43] process.

It is important to mention and record Earth's 'Carbon cycle', to fully embrace the complete carbon management process, as Carbon is considered the chemical backbone of life on Earth.[44] Reference Appendices: Carbon Cycle.

End Note: Publicly Available Specifications (PAS) are fast-track standardisation documents, specifications, codes of practice or guidelines developed by sponsoring organisations to meet an immediate market need.
It is the BSI Group who develop PASs in the UK which set industry-wide standards and are produced collaboratively by key stakeholders. They closely resemble a formal standard in structure and format and, if a majority consensus can be achieved and if they are endorsed by BSI, then PAS function as if they are British Standards.

The 'Climate Change' Project

In recent years, the study of Earth's environmental dynamics has become increasingly crucial. Researchers have focused on understanding how human activities and natural processes intersect to impact global ecosystems.

"The UN Climate Change Conference (COP[45] 29) closed on 24 November 2024, with a compromise[46] on climate financing for a new financial goal[47] to help least developed countries (LDCs) protect their people and economies against climate disasters and share in benefits of the clean energy boom." UN Climate Change Executive Simon Stiell referred to it as "an insurance policy for humanity".

Mankind's first real strategy with Environmental Laws and regulations was a major success.

The Montreal Protocol entered into force in 1989, which was a global agreement to protect Earth's stratospheric Ozone layer, by phasing out the production and consumption of ozone depleting substances[48] (ODS). Former UN Secretary General Kofi Annan stated, "Perhaps the single most successful international agreement to date has been the Montral Protocol".

The 2nd earth summit with the United Nations Framework Convention on Climate Change (UNFCCC) was convened in Rio de Janeiro, Brazil, in 1992, to address the urgent problem of environmental protection and socio-economic development.

This earth summit did embrace 27 Environmental Articles and Principles, with Article 21 adopting the principle of Sustainability, and the UNFCCC was formed in 1994 to stabilize the greenhouse gas emissions. It has not attained any satisfactory performance levels, though the annual Conference of the Parties (COP) on 'Climate Change and Environmental topics' was set up the following year, with the first Conference (COP 1) being held in Berlin in 1995.

The Kyoto Protocol in 1997 was intended to operationalise the UNFCCC by committing industrial Countries and economies in transition, to limit / reduce gases (GHG) emissions in accordance with agreed individual targets. Article 12 set up Certified Emission Reductions (CERs, equivalent: 1 tonne CO_2). It has yet to achieve a satisfactory performance level.

The Paris Agreement of 2015 was adopted by 196 Countries at COP21 and is the legally binding international treaty on climate change. It works on a 5-year cycle of increasingly ambitious climate action being carried out by the Countries at COP 21 to control greenhouse gases to 1.5^{0}C by 2030. This is classified as failure as the level has been reached in 2025.

Geology is the science of how Earth's functions have evolved. They contribute to man's understanding of the climate system and the rise in Carbon Dioxide. Observations from past records indicate that atmospheric CO_2 concentrations are now at their highest levels in at least the past 3 million years and is nearly without precedent in at least the past 3 million years, with the only known exception being the instantaneous meteorite-induced event that caused the extinction of non-bird-like dinosaurs 66 million years ago[49].

The International Court of Justice (ICJ) 'advisory opinion'[50] marks the first time that the ICJ, the United Nations' principal judicial organ, has examined the international legal framework applicable to climate change and largely rejects arguments put by major emitters of greenhouse gases (historical and current), including the UK. The 15 judges adopted an expansive interpretation of states' obligations. Despite being non-legally binding, the advisory opinion has significant implications for national climate policies and international climate negotiations. It also opens new pathways for international and domestic litigation against governments.

A major Environmental Impact Assessment (EIA) Analysis for a "Anthropological Climate Change Project" requires a structured approach, adopting latest 'project management services solutions' (APMS)[51] techniques, and utilising 'AI integrated linkage control' systems, to promote new ideas for the approach towards 'substantial completeness' of solutions to 'climate change for planet earth'.

A restructured master plan framework towards 'Climate Change' is urgently required to address the incompleteness of the present anthropogenic systems. An updated approach for the protection of the planet to embrace an integrated co-ordinated global programme strategy is required, and which to date, has evolved as a fragmented strategy, with some success, but with 'slippage failure' to the Anthropological 'Climate Change' targets[52].

Geology is the science of how the Earth functions and has evolved and, as such, it can contribute to our understanding

of the climate system Geology is the science of how the Earth functions and has evolved and,as such, it can contribute to our understanding of the climate system Geology is the science of how the Earth functions and has evolved and, as such, it can contribute to our understanding of the climate system

Summary

A lead Tier Global Environmental Organization[53] to be set out and developed for the care, maintenance and protection of Earth. To be developed based on five main Continents[54], for peaceful purposes, without religious / cultural influences.

A Global Environmental Structure Plan must now be set out and established for our common future, to enable near future anthropological Total Renewable Energy Projects to be built, as the bridge for future generations, to achieve successful long-term sustainability[55].

A structured framework of integrated Environmental Laws[56] must lead the way to meet the challenge of 'climate change' and all other adverse conditions harmful to our environment. The approach to be through a new specialised World Body Environmental Court, to be exempt from the influences of present religious and cultural ideals.

A comprehensive Suite of Handbooks[57] to be developed to manage the strategic 'Environmental Impact Assessment' (EIA) process, to tackle 'climate change' and other adverse harmful effects on the environment.

A 'World Atmospheric Structure Plan' (WASP)[58] to be set up to enable effective monitoring, recording and control procedures of the atmospheric world currents, and air borne pollution, around the globe. This to identify pollution risks spreading beyond boundary demarcation borders for all regional zones / continents.

Pressure[59]: Relentless increase in 'pressure's mechanism' throughout Earth's Ocean depths produce multiple linkage to other mechanisms, creating ever evolving environmental conditions which may be key areas for studying the origins of life as we currently understand it. Life's stratified layers, down to the Mariana Trench depth, are vital research areas for mankind.

A Comprehensive Management Structure system to be set out to co-ordinate and develop all anthropogenic Projects. Integrated Strategic Plans and Programmes to be adopted, in line with 'proven advanced project management services solutions'[60] (P2MS2).

Appendices

- Photosynthesis
- Atmospheric Prevailing Winds
- Ocean Facts
- Ocean Currents in perpetual motion
- Information Sheet – Carbon cycle.
- Chart: History of Climate Change.
- Climate Change - Information Sheet - Earth's primary Environmental Mechanism.

Addendum

- Periodic Table
- Structure of the Atom

End Note: This 'Climate Change' paper is intrinsically linked to a collection of published papers, gleaned from the ongoing open research Model (ORCiD No: 0009-0007-9479-3505): "Total Renewable Energy Master Plan' for this Planet, for all-natural environmental kinetic energy, embracing, solar / atmospheric / oceans / geo-thermal forces, for mankind". The structure records the history of the open research in three separate limbs: a 'trilogy of papers' published by several International Journals on the integrated theme Environment / Energy / Sustainability, followed by two linked papers embracing Earth's Environmental Mechanisms, followed by the preparation of a 'double paper' for a proposed new Global Environmental Organization for our planet. The research document aims for the long-term 'Sustainability' for mankind over the next 125 years, in compliance with ESG Principles.

Appendix 1 **Photosynthesis**

Facts Sheet

Subject: Photosynthesis

Carbon Dioxide + Water + $\xrightarrow{\text{Sunlight}}$ Sugar + Oxygen

$6CO_2 + 6H_2O = C_6H_{12}O_6 + 6O_2$

- The Photosynthesis process requires sunlight and low energy carbon dioxide.
- This releases oxygen and produces glyceraldehyde - 3- phosphate (GA3P)
- The carbohydrate molecules (high energy) converted into glucose
- These sugar molecules have the energised carbon needed by all living beings.

The photosynthesis process is multi-staged, based on a leaf structure comprising[61]:
Mesophyll *- the middle layer of several layers of cells.*
Stomata *- regulated openings (below the leaf)*
Chloroplast *- an organelle for the photosynthesis.*
Thylakoids *- stacks of disc shaped structures, within the chloroplast*
Chlorophyll *- embedded in the thylakoid membrane.*
Thylakoid lumen *- an internal space within the membrane.*
Granum *- is a stack of thylakoids*
Stroma *- liquid filled space around the stroma bed.*

Photosynthesis[62] is 2 distinct stages: the *light-dependent reactions* and the *light-independent reactions*. (The Calvin cycle)
The chemical energy collected in the 1st stage drives the assembly of sugar molecules from carbon dioxide.
The *light independent reactions* then temporarily store the energy using molecules as energy carriers. These carriers release energy and return for more energy.

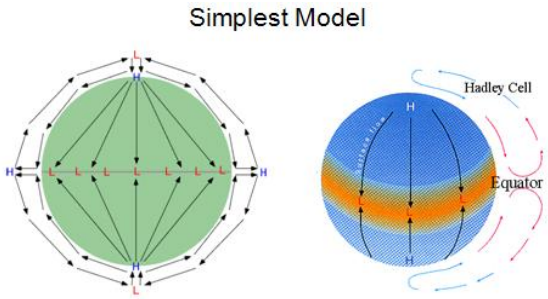
ATP + NADPH ATP + Pi + $NADP^+$
Adenosine triphosphate +Nicotinamide adenine dinucleotide phosphate

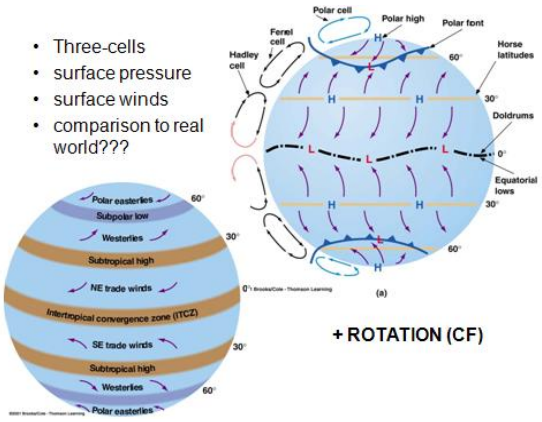
Adenosine triphosphate + inorganic phosphate (Pi) + Nicotinamide adenine dinucleotide phosphate

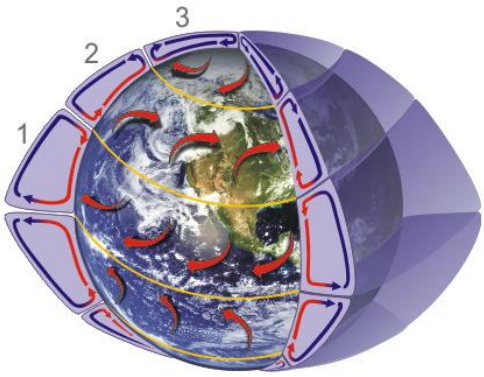
Summary statement:
→ Photosynthesis has transformed life on Earth.
→ By harness of energy from the Sun, the process evolved to allow living things to possess huge amounts of energy. Organisms called photoautotrophic, which require chlorophyll. This pigment absorbs portions of visible spectrum and captures energy from sunlight.
→ Eukaryotic autographs, plants and algae, have the organelles Chloroplasts = photosynthesis accumulates starch.
→ Prokaryotes, such as cyanobacteria altered process and occurs in folded membranes.

Plants and algae ➡ chloroplast organs ➡ photo synthesis ➡ starch

Appendix 2. Atmospheric Prevailing Winds[63]







Appendix 3 edit: 8 September2026

Facts Sheet

Subject: **Oceans Facts** **Date: March 2026**

The **Pacific and Atlantic Oceans** appear not to mix due to differences in water density, salinity, and temperature, which create a visible boundary known as **an oceanic front**! This striking phenomenon is especially noticeable near Cape Horn, where the ***Pacific's Humboldt Current meets the Atlantic's Brazil Current***.[64] 29 May 2025

Quranic Verses: Surah Ar-Rahman 55:19-20: "He has let loose the two seas (the salt water and the sweet, meeting together); between them is a barrier which neither of them can pass".30 Nov 2024

The **Indian Ocean is the warmest ocean in the world**. Long-term ocean temperature records show a rapid, continuous warming in the Indian Ocean, at about 1.2 °C (34.2 °F) (compared to 0.7 °C (33.3 °F) for the warm pool region) during 1901–2012

Atlantic Water has the same salinity as Arctic Bottom Water but is much warmer (up to 3 °C [37 °F]). In fact, this water mass is warmer than the surface water and remains submerged only due to the role of salinity in density.
This water mass is warmer than surface water and stays below only because its higher salinity increases density.

The density of sea water, however, is influenced by both its **temperature and salinity.** Density increases as salinity increases and as temperature decreases.28 Mar 2023

Salinity is the dissolved salt content of a body of water. It is a strong contributor to conductivity and helps determine many aspects of the chemistry of natural waters and the biological processes within them.18 Dec 2025

The concentration of salt in seawater (its salinity) is **about 35 parts per thousand**; in other words, **about 3.5% of the weight of seawater comes from the dissolved salts.**

Pressure is the force per unit area exerted by a fluid, while **density** is the mass per unit volume of a substance. In general, pressure and density are directly proportional to each other, meaning that **as pressure increases, density also increases**,

Five Ocean Zones[65]**:** Sunlight Zone (Epipelagic) / Twilight Zone (Mesopelagic) / Midnight Zone (Bathypelagic) / Abyssal Zone (Abyssopelagic) / Hadal Zone (Hadopelagic)

The **mesopelagic zone** serves *as a transitional environment where carbon and nutrients are sequestered*, playing a critical role in the global carbon cycle. The Oceans is the largest sink on the planet.

Man's Perceived Science

Bernoulli's principle is a key concept in fluid dynamics that relates pressure, speed and height. For example, for a fluid flowing horizontally, Bernoulli's principle states that an increase in the speed occurs simultaneously with a decrease in pressure.

The pascal (symbol: Pa) is the unit of pressure in the International System of Units (SI). It is also used to quantify internal pressure, stress, Young's modulus, and ultimate tensile strength. The unit, named after Blaise Pascal, is an SI coherent derived unit defined as one newton per square metre (N/m^2).

When you add salt to the water, it dissolves and increases the amount of matter in the water without increasing its volume, causing the water's density to increase. With enough salt added to the water, the density of the water is greater than the egg , allowing the less dense egg to float. Example: In the Dead Sea, Man's buoyancy mechanism could flip over without body self-restraint.

Appendix 4 edit: 5 September 2026

Earth's Environmental Mechanisms - Oceans Currents in perpetual motion

Facts Sheet

Subject: ***Earth's Environmental Mechanisms - Oceans Currents in perpetual motion.***

Thermohaline Circulation[67] is the slow but relentless ***driving mechanism*** creating *Ocean circulation*, supported by secondary mechanisms from the ***prevailing winds*** **and the** ***solar power*****.** **Temperature** and **Salinity** are the two characteristics of seawater that changes the density of the water. Cold and salty water is denser than freshwater. Cold water will sink below warmer water, denoting a further mechanism[68].

It is allegedly stated that it *would take over 1000 years*[69] *to complete the oceans circulation mechanism.* Reference IPCC Smithsonian figure[70].

The importance *mechanism* of *Earth's poles* for Ocean circulation.

- Seawater freezes, it leaves salt.
- Remaining water becomes saltier, and denser.
- Increase salt lowers freezing temperatures.
- Highly salted water sinks below other seawater, *creating another mechanism*, known as ***downwelling***.
- This 'down-well' water pushes water along the depths / pulls water across the surface, creating a pump effect that creates movement to the ocean, providing the mechanism for the 'Ocean conveyor'.

Reference '*finger of death'*, known as *a 'brinicle'*[71].
Ice formation in these immersed conditions create channels of **brine** (very salty water), colder than freezing, creates the mechanism for moving down through channels of ice, collects more salt with further cooling. In shallower areas brine reaches seabed, before warming / diluting and this environmental mechanism results in threat to small marine creatures (sea cucumbers etc).

Anthropologic Observation: Ocean circulation relies on cooling / sinking of water at earth's poles. As the greenhouse effect raises temperature, particularly at the poles, water no longer getting as cold. Results – less sea ice form – water has increase melt water dilution. Water getting less cold / less salty, resulting in surface water being marginally less dense, thus sink marginally less. This natural based condition is marginally slowing down the process; resulting in the question, **Is the Ocean circulation slowing down**[72]**?**

Test: Under above ocean circulation mechanism, identifying **'***older water'* would mean proof of *slowing circulation mechanism.*
Carbon-14 Isotope -a radioactive isotope of carbon could be utilised for this purpose. This is termed *carbon dating*.
Apparent Oxygen Utilisation: This principle is deep water cannot have oxygen added.
Noth Atlantic Deep Water formed in Arctic by cold, salty water sinking and flowing south, and in Southern Ocean meets another body of water, but does not mix.(Due to different densities of masses) Antarctic Bottom Water formed at south pole, is coldest water / densest of all, termed powerhouse of Ocean circulation.
Keeping Earth's poles cool keeps our Ocean mass moving.

Relentless increase in 'pressure's mechanism' throughout Earth's Ocean depths produce multiple linkage to other mechanisms, creating ever evolving environmental conditions which may be key areas for studying the origins of life as we currently understand it. Life's stratified layers, down to the Mariana Trench depth, are vital research areas for mankind.

Appendix 5

Subject: **Carbon cycle** **Date:** August 2026

The Carbon cycle mechanism supports life by transition of carbon across Earth's: Atmosphere / Oceans / Soil / Plants / Animals /Minerals /Microbes[73].
The Geological Carbon cycle is how carbon moves between rocks and minerals, seawater, and the atmosphere. It takes place over millions of years[74].

Without carbon, life as we know it would cease to exist because it is the main element in organic compounds that make up living things.

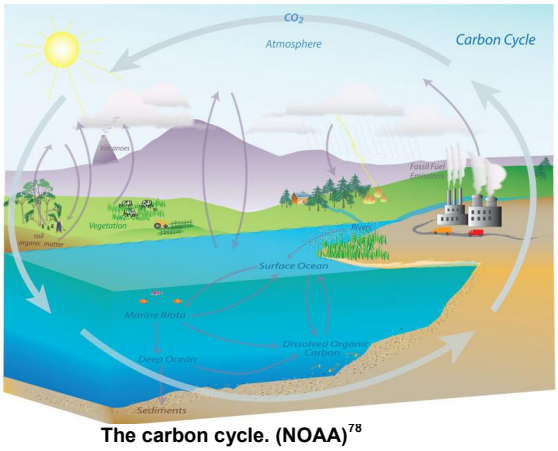
Make-up of the human body: By mass, about 96 percent of our bodies made of four elements: oxygen (65 %), **carbon (18.5 %)**, hydrogen (9.5 %), nitrogen (3.3 %).
NOTE: Water makes up between 60-70 % of the human body, H_2O, common chemical components.

Organic chemistry is the study of the structure, properties, composition, reactions, and preparation of **carbon-containing compounds**[75].

Carbon is a special element in the **Periodic Table** [No. 6/Group 14]/p-block], because of its ability to form stable bonds with a number of other heteroatom elements.

Reference Appendix 1, photosynthesis – CO_2 ➡ Biogeochemical mechanism.
Carbon is the backbone in DNA structure[76].

Carbon is the chemical backbone of life on Earth, and Carbon compounds regulate Earth's temperature across the globe and the make-up of food that sustains us[77].



The carbon cycle. (NOAA)[78]

End Reference: The Deep Carbon Observatory Project, *an ambitious endeavour that sought to quantify the planet's carbon reserves*[79].

Appendix 6 – History of Climate Change[80]

The United Nations 1st Earth Summit in Stockholm

Conference on the Human Environment on 16th June 1972
Including the Stockholm Declaration and Action Plan for the Human Environment
embracing 26 Principles, placing environmental issues at forefront of international concerns.
United Nations Environmental Programme (UNEP)
is responsible for coordinating responses to environmental issues within the United Nations system.
established after UNIP in Stockholm in June 1972.

Brundtland Report

United Nations published 1987
Gro Harlem Brundtland, former Norwegian Prime Minister, Chair of World Commission on Environment and Development (WCED)
Sustainable development three fundamental pillars: **social, economic and environmental**

The Montreal Protocol

Agreement signed 1987 – entered into force 1989.
On Substances that Deplete the Ozone Layer
Global agreement to protect the Earth's ozone layer by phasing out the chemicals that Deplete it.
Incudes both production and consumption of ozone-depleting substances.

The United Nations Framework Convention on Climate Change. (UNFCCC)

Signed in some 153 Countries at the 2nd Earth Summit in Rio de Janeiro, Brazil in 1992, - 27 Principles.
Signed **Convention on Climate Change (CCC)** Articles 27 - (CBDR)], & **Convention on Biological Diversity (CBD),** endorsed Rio Declaration & Forest Principles, & adopted **Agenda 21**, for sustainable development.
Countries submit plans for climate action, **nationally determined contributions (NDCs) -** Paris Agreement (Article 4).
The **Commission on Sustainable Development (CSD)** to monitor and report on implementation of the **CBD** has two supplementary agreements: Cartagena Protocol & Nagoya Protocol (Biosafety – LMOs: governing movement of 'Living Modified Organisms').

The UNFCCC was formed in 1994.

To stabilise the greenhouse gas emissions and to protect the Earth from the threat of Climate Change.

Conference of the Parties (COP)

On Climate Change / Environmental Topics
Apex decision-making body of the UNFCCC
The first conference (COP 1) was held in 1995 in Berlin.

The Kyoto Protocol was adopted on 11 December 1997

Operationalises the UNFCCC
By committing industrial Countries and economies in transition to limit and reduce gases (GHG) emissions.
In accordance with agreed individual targets.
28 Articles / Annex A – $CO_2/CH_4/N_20$/HFCs/PFCs/SF_6 & Sectors & Source Categories / Annex B – Quantified emission limitation or reduction commitment.
Article 12 - Allows CERs **(Certified Emission reductions)** [equivalent: 1 tonne CO_2]

The Paris Agreement (2015)

Legally binding international treaty on climate change.
Adopted by 196 Countries at COP 21 in Paris, on 12th December 2015
Works on a 5-year cycle of increasingly ambitious climate action carried out by the Countries.
Adopted at COP21 to control 'green house gases' to 1.5^{O}C by 2030.

Appendix No 7

Information Sheet

Subject: **Climate Change – Earth's primary Environmental Mechanism**

Sun's Energy mechanism:

Energy transfers to / from Earth's system via electromagnetic mechanisms .

⬇

As perceived by man: infrared radiation / ultraviolet radiation / visible light.

⬇

Sun energy to Earth - ultraviolet radiation – shortwave, high body temperature

⬇

Earth energy release -Infrared radiation – longwave, lower temperature

⬇

Stable: Earth receives / releases balanced quantity =Temperature stable.

Main mechanism steps:

- Sun emits high-energy electromagnetic radiation, classified as short wavelength, embracing **'ultraviolet radiation'** and **visible light**.
- Earth's surface has much less intense radiation, a longer wavelength radiation, and is classified as **infrared radiation**.
- Transparency index: atmosphere not totally transparent to all electromagnetic radiations, behaves as a selective filter, absorbs, reflects and allows through distinctive radiations bands, dependent on the atmospheric make-up of the gases.

Atmosphere comprises: N_2 / O_2 / H_2O / CH_4 / N_2O.
Mostly Nitrogen & Oxygen: completely transparent to allow infrared radiation.[99.03%]
Other trace gases [<1%] of various opaqueness named **greenhouse gases** ('GhG'),
water vapour (H_2O). / Methane (CH_4) / nitrous oxide (N2O)

By volume, the dry air in Earth's atmosphere is perceived about 78.08 percent nitrogen, 20.95 percent oxygen, and 0.93 percent argon. A brew of trace gases accounts for the other approximately 0.04 percent, including the greenhouse gases carbon dioxide, methane, nitrous oxide and ozone. 9 Oct 2019

Atmosphere not fully transparent – selective gases reflects / absorbs some radiation.
Some gas fluids opaque to infrared – prevented from leaving, thus warms up atmosphere.
Note: Without opaque reflective atmosphere, all planets would be frozen.
'Climate Change' mechanism is termed the ***greenhouse effect***.
Note: poor example -no air currents flowing along inside face of (greenhouse) glass, unlike trade winds below atmosphere.

Fossil Fuels: Coal / Oil / Gas:

- Man burning these fuels since Industrial Revolution – **Anthropogenic 'GhG' Emissions.**
- Man's other activities to harm the atmosphere includes deforestation / agricultural processes / production of cement for Infrastructure / synthetic organic compounds (fridges / air-conditioning systems)
- Main anthropogenic 'GhG' emissions, Classification strengths:

Greenhouse gas.	Carbon dioxide equivalent
Carbon Dioxide	1
Methane	28
Nitrous Oxide	265
Chlorofluorocarbons (CFCs)	Up to 13,900
Hydrofluorocarbons (HFCs)	Up to 12,400
Perofluorocarbons (PFCs)	Up to 8,221

Addendum 1. Periodic Table – Basic format / Perceived Structure[81]

118 atoms are classified in the form of 7 periods (Rows) and 18 groups (Columns) .

To follow the perceived structure of physical statistics, two strings named **lanthanides** and **actinides** are located below in 2 rows

The **lanthanide** or **lanthanoid** series of chemical elements comprises at least the 14 metallic chemical elements with atomic numbers 57–70, (element 71), is sometimes included[82]

The **actinide** or **actinoid** series encompasses at least the 14 metallic chemical elements also included with atomic numbers from 89 to 102; lawrencium is sometimes included.

Distinctive Groups:
The Alkali Metals (Group 1, except hydrogen)

The Alkaline Earth Metals (Group 2)

The Transition Metals (Groups 3-11)

Post Transition Metals: located between transition metals and metalloids.

Metalloids: display both properties of metals and non-metals.

Halogens Group 17): Fluorine, F / Chlorine, Cl / Bromine, Br / Iodine, I /
& Radioactive elements **/ Astatine, At / Tennessine, Ts**

Noble Gases (Group 18): Helium, He / neon, Ne / argon, Ar / krypton, Kr / xenon, Xe / radon, Ra / oranesson, Og ------ Group 18 (VIIIa) **----** *Initially believed they could not combine with other elements.* (Later, Group No. changed from group O to group 18.)

Basic Structure Spine Framework
The outline structure frame is perceived as being presented in 4 blocks – s-d-p-f.
The f-block, 'fundamental' intended before column 3, and the two rows shown below blocks s, d, p.[83] (Lanthanide and actinide rows.)
The letters originate from an early system perceived by physicists (not chemists) to describe lines in atomic emission spectra, before actual shapes of electron orbitals were understood. The spectral lines were grouped and named as: s = sharp / p = principal / d = diffuse / f = fundamental.

End notes:
Metals are found on the left of the periodic table and non-metals on the right.
Man's Science perception for Chemical elements structure plan[84] (Reference Addendum 1)
The periodic table Structure may be used to locate any element**.**
Anthropology states the **elements of life** as: carbon (C), oxygen (O), hydrogen (H), and nitrogen (N)—which make up 96% of living matter.
Main components of air: **N, 78% / O_2 21% / CO^2 0.04% / Argon .93% / Traces .03%**

Addendum 2: Structure of the Atom[85] edit: 2 September 2026

Perceived Definition: Atoms consist of a **nucleus** containing **protons** and **neutrons**, surrounded by **electrons** in shells. The numbers of *subatomic particles* in an atom can be calculated from its atomic number and mass number[86].

Man's Science*: Atoms are perceived to be* ***extremely small, positively charged nucleus surrounded by a cloud of negatively charged electrons****.* The nucleus is perceived to be less than one ten-thousandth the size of the atom the nucleus contains more than 99.9% of the mass of the atom[87].

Size: A convenient unit of length for measuring atomic sizes is the angstrom (Å), defined as 10^{-10} metre. The radius of an atom measures 1–2 Å. Compared with the overall size of the atom, the nucleus is even more minute. It is in the same proportion to the atom as a marble is to a football field. In volume the nucleus takes up only 10^{-14} metres of the space in the atom—i.e., 1 part in 100,000. A convenient unit of length for measuring nuclear sizes is the femtometre (fm), which equals 10^{-15} metre. The diameter of a nucleus depends on the number of particles it contains and ranges from about 4 fm for a light nucleus such as carbon to 15 fm for a heavy nucleus such as lead. Despite the small size of the nucleus, virtually all the mass of the atom is concentrated there.

Perceived Structure: The protons and neutrons form the atom's central nucleus.
(The ordinary hydrogen atom is an exception; it contains one proton, but no neutrons.)
Protons have a positive electrical charge.
Neutrons are electrically neutral—they carry no charge.
Circling the nucleus is a cloud of Electrons, which are negatively charged.
Perceived like opposite ends of a magnet that attract one another, which binds them to the nucleus.
The nucleus is small and dense compared with the electrons, which are the ***lightest charged particles in nature.***
The electrons circle the nucleus in orbital paths called shells , each of which holds only a certain number of electrons. The outer shell is the valency shell[88].
An ordinary, neutral atom has an equal number of protons (in the nucleus) and electrons (surrounding the nucleus); thus, the positive and negative charges are balanced.
Some atoms, however, lose or gain electrons in chemical reactions or in collisions with other particles.
Ordinary atoms that either gain or lose electrons are called ions. If a neutral atom loses an electron, it becomes a positive ion. If it gains an electron, it becomes a negative ion.
These basic **subatomic particles—protons, neutrons, and electrons**—are themselves made up of smaller substances, such as quarks and leptons.[89]

As Perceived through quantum physics: The electron wave is uniform in all directions from the nucleus, is peaked at the centre of the atom, and has the same phase everywhere. Higher energy levels in the atom have waves that are peaked at greater distances from the nucleus.
Quantum Physics definition: Atoms, the smallest particles of an element that exhibit the properties of that element, consist of negatively charged electrons around a central nucleus composed of more massive positively charged protons and electrically neutral neutrons.23 Jun 2019

Endnote: *Perceived as a shell, or wave; Or created, or formed by undiscovered energy form?*
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Perceived on Man's Science embracing 85% mass of Universe, with sensitive dark matter detectors, called LUX-ZEPLIN (LZ), or other form of unknown energy methodology.

Foot Notes

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