OPPORTUNITY #25

What if the atmosphere was given the ability to self-heal?

LET THAT (CARBON) SINK IN

Using the example of the ozone layer's capacity to repair itself, advances in nanotechnology are used to build a self-repairing atmosphere that absorbs greenhouse gases, restoring balance for the benefit of the earth's climate and allowing nature to regenerate.

MEGATREND
Saving Ecosystems

TRENDS
Air Pollution
Nanotechnology
Restoration

SECTORS AFFECTED
Agriculture & Food
Materials & Biotechnology
Automotive, Aerospace & Aviation
Chemicals & Petrochemicals
Consumer Goods, Services & Retail
Data Science, AI & Machine Learning
Education
Energy, Oil & Gas & Renewables
Financial Services & Investment
Health & Healthcare
Infrastructure & Construction
Insurance & Reinsurance
Manufacturing
Metals & Mining
Government Services
Professional Services

WHY IT MATTERS TODAY

The atmospheric concentrations of most greenhouse gases, including carbon dioxide, methane and nitrous oxide, have increased over several centuries but most significantly since the Industrial Revolution. Between pre-industrial times (late 18th century) and 2021, carbon dioxide concentrations rose from an annual average of 280 parts per million (ppm) to 414 ppm – a 48% increase.[466] Moreover, the concentration of methane has more than doubled since pre-industrial times, reaching over 1,800 parts per billion (ppb) in 2021.[467] Concentrations of nitrous oxide reached 334 ppb in 2021.[468]

Greenhouse gases have been attributed to human activities causing a substantial part of the warming of the earth's climate.[469] Carbon dioxide has been identified as the biggest contributor to warming, followed by methane and black carbon (soot).[470] Although certain other activities have caused cooling, the net result has been a 1.1°C increase in temperature since 1880.[471]

Various carbon-capture methods and technologies have been proposed to curb emissions.[472] Other ways of reducing the amount of carbon in the atmosphere include planting forests, expanding farms, using bio-energy with carbon capture and storage and using ocean-based carbon removal methods.[473] The global carbon capture and storage market was sized at $3.22 billion in 2021 and is expected to grow at a compound annual growth rate of 5.8% from 2022 to 2030. The potential global market size for carbon capture and storage is estimated to reach $4 trillion by 2050.[474]

THE OPPORTUNITY

A combination of technologies can be used to seed the atmosphere with nanocatalysts – nano-sized catalytic materials that detect greenhouse gases and then either neutralise them or convert them into environmentally safe and useful chemicals and other derivatives, such as hydrogen gas.[475]

However, as gases that trap heat and cause other health and air quality issues, greenhouse gases are a challenge on the path towards managing climate change. As well as carbon dioxide, methane and black carbon, there are fluorinated gases and nitrous oxide. All stay within the earth's atmosphere for various periods of time ranging from a few years to a few thousand years.[476]

A global multilateral project could be developed to disperse nanocatalysts at strategic points around the globe, with trade winds and selected weather fronts affecting the dispersal in such a way as to maximise greenhouse gas neutralisation or conversion. The levels of ocean, soil and atmospheric carbon and other gases could decline rapidly (even as emissions continue), with levels falling below the most optimistic targets set by the Intergovernmental Panel on Climate Change. Ecosystems would be reinvigorated and return to their natural carbon-absorbing cycles, further slowing and eventually reversing the worst effects of climate change.

BENEFITS

Elimination of climate change and global warming. Increased growth, prosperity and well-being.

RISKS

Risk of over-reliance on geoengineering solutions rather than the prevention of emissions and greenhouse gases.

414 PPM

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280 PPM

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