

GLOBAL Warming factors

- G Gases
- L Light
- O Orbit
- B Balance
- A Acceleration
- L Land use

The combinations of these factors is producing climate change. No one knows the relative importance of each. Each has been very significant in the past or could be in the future. Only some of these factors are affected by human activity.

G – Gases

We are changing the content of every breath we take. Several different gases are poisoning life on earth – and not just carbon dioxide.

Each gas is important, produced in different ways, but with twenty-fold differences in their effects per ton. But we need more data on the human use of carbon, as a proportion of total global emissions. These gases don't just come from human action. Volcanoes for example have a significant effect.

Evidence from ice cores allows us a crude review of earth history. Trapped in deep layers of ancient ice several kilometres thick are tiny bubbles of air. These layers can be read like rings on an ancient tree – one per year – taking us back a million years. And in each bubble is a perfectly preserved mix of gases which is identical to what it was in that year.

The ice too tells us a story: different forms of hydrogen atoms (isotopes) are more common at different atmospheric temperatures, and these too are locked into ice layers. So we can build up a picture year by year not only of carbon dioxide levels, but also an indication of earth

temperature.

Scientists have noted that in many cases the temperature seems to rise BEFORE carbon dioxide levels. Maybe another event triggers the process, and then it becomes self-perpetuating for a while as increased carbon dioxide leads to more warming and more carbon dioxide and so on.

Water vapour is also significant – especially when millions of tons are pumped into the upper atmosphere by aircraft, producing vapour trails that contribute up to 15% of cloud cover in some parts of the world. Many scientists think that more trails means more insulation, and warmer temperatures.

L – Light

Life on earth depends on heat from the sun, but this is powered by a massive nuclear fusion reaction, which varies in power. Over past millions of years, these natural shifts have affected climate. That's why scientists are so interested in solar flares and spots.

O – Orbit

The earth is tilted on an axis, so that as we journey around the sun the seasons change. Because the earth is mostly a red hot core of molten rock, the mass of the earth shifts as it turns, creating a slight wobble, or change in axis over millions of years. In the past such small changes may have had a huge effect by increasing or decreasing seasonal variations.

B – Balance

The earth has powerful self-regulatory mechanisms. We don't know the limit of self-regulation. It is impossible to calculate the [risks](#) of major disruption by our own actions.

Over millennia the natural balance has shifted. Vast amounts of atmospheric carbon has been captured by plants and trees. A significant amount has been gradually stored away over millions of years in oil, gas, coal and peat deposits – hugely undone in just a hundred years of burning.

A – Acceleration

Our world contains a number of feedback loops which are huge [risks](#) for our future. We could see an accelerating process, a spiral of disaster. Take peat: wet peat is stable but as it dries in warmer weather, it becomes food for fungi and bacteria and is rapidly decomposed into carbon dioxide. Peat decomposition could be a significant source of carbon dioxide emissions in future.

L – Land use

While clearing of forests has obvious impact, so does how land is cultivated (variations in radiant energy and evaporation) or used for animals (methane production from sheep or cattle is xx% of total global emissions.)

Then there is biofuel. It's easy to make diesel from food, but making food also uses energy in machines, fertiliser and transport. Net energy gain may be small. Using biowaste sounds more ecowise but robs soil of natural fertiliser, so synthetic fertiliser is needed which also uses energy. Biofuel use has pushed up food prices dramatically which is causing hardship to the poorest around the world. They cannot compete with wealthy car owners who want to fill their vehicle tanks with food.

A paradox: while the surface of the earth is warming, the inside core is cooling. If the earth were the size of a football, the earth's crust would be the thickness of little more than an egg shell. The rest is red hot liquid stone, and as we will see, this offers huge opportunities for energy generation.

Impacts of Global WARMING

How every aspect of our world will be affected.

W Wet

A Arid

R Radical

M Migration

I Innovation

N Nuclear

G Global Government

W – Wet

More heat means more evaporation, clouds, rain, hurricanes, monsoon floods and major disasters. Large insurance companies are worried. Property owners in some coastal cities will find it almost impossible to get full insurance cover.

Water expands as it warms, which is the main reason why sea levels are rising. To this we need to add the impact of ice melting. But when submerged ice melts there is far less impact than ice melting on land (watch ice cubes melt in a drink).

A – Arid

Population growth and increasing consumption per person means the world was already heading for severe water shortages even without climate change.

While some places will become wetter, others will turn to desert, including huge additional areas of Australia. Vast regions will be chronically short of water.

Many millions of people in places like Africa will face a stark choice: either starve to death or

migrate.

WET and ARID are a pair – they drive the next TWO IMPACTS

R – Radical

Constant warnings of possible catastrophe will change how people think and feel. Expect tens of thousands of new single issue activist groups, and new global movements which demand changes in how we live, how corporations behave and in what [governments](#) allow. While the dominant theme will be climate change, there will be wider concerns about global and personal sustainability. This will go far beyond environmental issues – sustainability of family life, stress levels and personal balance for example.

M – Migration or Mobility

It is likely that a large part of Bangladesh will be uninhabitable without severe risk of drowning, displacing up to 100 million people. In addition there are tens of millions in other nations who will migrate as their subsistence farms become desert.

Expect vast movements of people, whether unofficial or as part of a globally organised rescue plan. These migrations (or lack of them) will fuel national and international tensions.

At the same time expect growing restrictions on day to day travel in a bid to reduce energy use. Expect every large corporation to include travel audits in annual reports. Every industry will be affected by demand for information – for example about how many tons of fuel miles were used flying tomatoes from Brazil to the UK.

RADICAL AND MIGRATION are a pair – drive next two impacts

I – Innovation

Global warming is creating the greatest growth of a new market that we have seen in all of human history. Expect a hundred million large and small inventions, discoveries or new ways of doing things, many of which will be turned into products or services.

N – Nuclear

Explosive economic advance of places like China and India will mean our world remains acutely short of power from every source. This in turn will guarantee that carbon will continue to be burnt in ever larger amounts unless we find a major alternative. While carbon capture will be widely used, this will only help at places where carbon is burnt in large amounts – at power stations.

Expect huge international investment into next generation nuclear technologies, including nuclear fusion which could provide unlimited energy at low cost, with minimal environmental risk compared to nuclear reactors today.

G - Global Governance

How will this Wet, Arid, Radical, Migratory, Innovating and Nuclear world be run? Global warming will accelerate demand for global governance, as the world comes to recognise that we all live and die together. We will see governance form for other issues in parallel, whether to control global spam and e-fraud, or pandemics like mutant flu.

The political landscape will become as complex as it was in the cold war era, with new giants such as India and China, flexing political power against the enlarged European Union on the one hand (pro-active) and the United States on other (reluctant leader), with added [risks](#) from oil and gas enriched Russia.

Many more [Global Warming Videos by Futurist](#) Dr Patrick Dixon and [Sustainagility](#) book.

Articles and Videos on Global Warming

Here are more resources on this site that you may find helpful.

[True Cost of Global Warming](#)

[How business will help solve global warming with green technology](#)

[CARBON DIET to save the World](#)

[Global Warming - Science Summary](#)

[Future of Oil Prices: Middle East, global economy](#)
[Roof Gardens Impact on Energy Saving](#)
[Biofuels Controversy and Climate Change](#)
[Iceland Volcano Eruption - Geothermal Power Potential](#)
[Energy Use Consulting - Boom Industry](#)
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[Green Technology Innovation Awards Chaired by Patrick Dixon](#)
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[Cost of global warming - practical answers](#)
[The \\$40 trillion climate change business](#)
[Impact of Global Warming on Human Life](#)
[The Future of the Environment](#)
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