Sustainability

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We all know that we need to live sustainably on this planet, but few people seem to know what that means in practical terms. We know that the planet is heading, lemming-like, towards environmental disaster, which in some estimates is only 3-4 years away, others seem to think we have decades. With such a range of doubt, I take the view that we should act as if the shortest estimate was right, then we can cover all possibilities.

There is a website called Research Gate, (https://www.researchgate.net), which contains a long and very active discussion about how to define "sustainability". Thousands of answers have been submitted by many contributors. These answers become more and more detailed without ever, in my opinion, addressing the fundamental question. This article is an attempt to do that.

The fundamental test of sustainability is this: can we, as a species, continue the same pattern of behaviour for ten years, a hundred years, a thousand years, a million years into the future without negatively affecting our quality of life, and without leaving our descendants an impossible clean-up operation to perform? This question can be applied to any and all patterns of behaviour.

Take, for instance the use of **nuclear power** for electricity generation. This is seen by many as a means of providing all the energy that we need without negatively impacting the environmental carbon dioxide level. After just 71 years of nuclear power generation, there is so much high level nuclear waste that it is already a serious embarrassment. There have already been four serious reactor melt-down incidents that we know about: Fukushima in 2011; Chernobyl in 1986; Three Mile Island in 1979; and SL-1 in 1961; there may have been other unreported incidents within military installations that we know nothing about. Nobody knows how to clean up these melt-downs that uncontrollably continue to emit highly radioactive and toxic materials into the environment.

Decommissioning a nuclear reactor generates even more high level waste than that produced by refuelling during its life-time. High level nuclear waste needs to be sequestered for at least 96,000 years, and the expected exponential increase in the quantity of power generation reactors will be a massive and increasingly unsolvable problem for all future generations of our descendants. We cannot go on like this. Nuclear power generation is not a sustainable way forward.

Take, for instance, environmental contamination with **plastic micro-particles**. Every photograph of microscopic sea-plankton now shows their transparent bodies having microscopic plastic particles embedded in their tissues, some are fluorescent and shine brightly under the photographic light. A statement on TV recently said that every human carries enough plastic micro-particles in his or her brain to make a plastic tea-spoon. Could the apparently increasing rates of vascular dementia be related to the build-up of these particles in the capillaries that exchange oxygen and nutrients with carbon dioxide and urea between blood and the cerebrospinal fluid in the meninges? I estimate that about two thirds of the plastic micro-particles in the environment come from so-called bio-degradable plastics. These plastics degrade in strength without becoming an active living part of the environment. Nobody yet knows how to take such particles out of the environment. This is the situation after about a hundred years of plastics production at exponentially increasing rates; what will the situation be after another hundred, a thousand, ten-thousand years? This is clearly not a sustainable practice.

Take, for instance, the government legislation that decrees that almost all new **road vehicles** must be **battery powered** by 2030. These vehicles depend on lithium

batteries. Lithium is a scarce resource on the planet, there are only a few small sources, and my estimate, based on the likely rise in the number of battery farms intended to stabilise the electricity grids in developed countries and the lack of any effective recycling of lithium from batteries that manufacturers recommend replacing every two years, is that there will be an exponential increase in price, doubling every 1.2 to 1.5 years to a point in about fifteen years where it becomes totally uneconomic to use lithium for vehicle propulsion or grid stabilisation. Moreover, when an electric vehicle is involved in an accident, any metal penetrating the battery case starts a fire that cannot be extinguished with temperatures estimated to be up to a million degrees Celsius. The shift to all electric vehicles is clearly not a sustainable option.

Take, for instance, the **planned obsolescence** built into so many manufactured products these days. I have a watch made by a quality manufacturer and purchased seventeen years ago. It is a high quality product: solar charger built into the watch face, replaceable rechargeable batteries, waterproof to 300 feet, (90m) and all stainless steel case. It has the potential to last for a hundred year or more, except that the strap has a small component made of a soft rubber built into the ends that attach to the watch that started to deteriorate after only ten years and is now seriously perished. I tried to get a replacement, but every few years they change the design of the bits that stick out of the watch that the strap attaches to. This makes the strap incompatible with any other manufacturer's strap design. They do this deliberately to force people to replace the watch periodically, unnecessarily throwing away a piece of equipment that is not only expensive but that also contains scarce planetary resource materials.

There are many other examples. I purchased a quality laptop computer in 2011. It uses Windows 7 as its operating system. The computer hardware is perfectly good and could last for many years. I am told repeatedly that I have to upgrade to Windows 11, and I know that my computer will slow down to an impossible degree if I do this. There is nothing provided in Windows 11 that I want or need, and I know that it is not a stable platform – there are many operating system errors. This is **planned obsolescence** again. This happens throughout industry and is clearly not a sustainable practice.

There are many proposed solutions, planting trees, for instance. Yes, trees mop up large quantities of carbon dioxide, but it is not a sustainable solution. Every tree eventually returns the carbon dioxide it has absorbed during its lifetime to the environment through rot and decay, through burning or through the eventual demolition and disposal of buildings and other structures made of wood. One significant effect of global warming is a marked increase in forest fires. Such wildfires can, in just a few hours, return to the environment many decades of carbon dioxide absorption.

People seem to think that the sea is an infinite sink for carbon dioxide. It isn't. Once the carbon dioxide concentration reaches a certain level, important food-chain species such as krill start to die off, and their death and decay adds carbon dioxide to the environment as well as starving other species further up the food chain. It will eventually lead to a mass extinction event.

I have written a series of articles under the general heading "A Future Free from Fossil Fuels". They can be found on my website: https://www.intint.co.uk/environ.html . These articles propose a comprehensive and sustainable way of generating electrical power from renewable sources, extracting carbon dioxide from the environment, and sequestering it in disused oil and gas wells to stabilise and reverse global warming whilst using some CO_2 to generate a synthetic fuel, (methanol), to power vehicles. I invite you to read what I have written and to contribute your ideas, (which if included will be acknowledged), to the whole so that we may all look forward to a truly sustainable future.

