Why the Mobile Phone is Incompatible with an Ecological Lifestyle

Environmentalists often criticise politicians for only valuing the world by its monetary or GDP value. The reality is, when environmentalists only consider carbon emissions as the primary measure of sustainability, are they any different? To understand our true impact on the environment we have to look at the complex ecological factors which make up our lifestyle; **of all those, the one which embodies them all is the mobile phone.**

http://www.fraw.org.uk/frn/2019/mobile-phone.html

94 percent of adults in Britain had a mobile phone in 2017 – *why is there no debate about the impacts of this trend?*

In just 10 years, more than 7 billion smart-phones have been produced and more than 1½ billion smart-phones go on sale each year – up from just 300 million in 2010 and a billion in 2013.

250 terawatt-hours (TW-h) of power are currently used to manufacture smart-phones – 1% of global electricity generation, more than the annual power consumption of 60 countries.

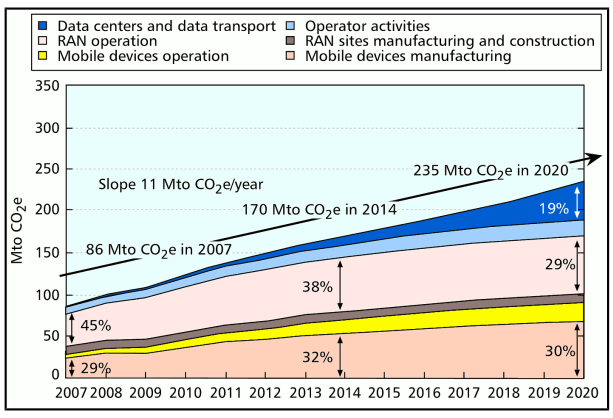
95% of that energy is expended in the manufacture of the chips, in particular the memory chips (by comparison laptops have a fifth the footprint of smart-phones, desktops lower still).

An average cellular base station takes 75GJ to build, and consumes 150GJ over its 10 year life. That means 1 base station over its ten year life consumes 1½ houses-equivalent of electricity – and there are currently 40,000 base stations in Britain.

Putting 5G just along the motorways network will require 25,000 to 60,000 more base stations.

On top of that, all the rest of the machines providing the data network are consuming 600TW-h per year, and that is expected to grow to 1,700TW-h by 2030.

A tailings dam in northern China, producing rare earth metals



What's the carbon footprint of a phone? *WE DON'T KNOW!* – as in we know, but not within a factor of 100 either way.

Apple have the best supply chain information, and provide the most comprehensive environmental reporting – but that doesn't mean it's accurate.

Likewise, the footprint of the Internet has the same problem. E.g., in Australia each person Internet user was calculated to emit 82 $kgCO_{2(e)}$ per year. In Sweden, which has a cleaner power supply, a study said 200-230 $kgCO_{2(e)}$.

Apple put the carbon footprint of their phones between 50-100 kilos $CO_{2(e)}$. 80% of that is in manufacture, another 15% over its it for three years. The remainder disposal and transport.

Arguing that you "only use your phone for emergencies" is actually worse, because it means most of the energy and pollution was expended but you are not justifying that impact by actually using the device.

The problem with these studies is that they assume people are using computers as they did in the 1990s or 2000s. They omit a critical new factor – ***the Cloud***. Adding background computing power to phones can more than double its direct ecological footprint. *Apps.* that change the way you look, or back-up for data, or work as satnavs – *that's background computing.*

Running the cellular network to connect the world's 7 billion phones is estimated to emit between 200 to 600million tonnes (Mte) of $CO_{2(e)}$. The Cloud complicates this by running power hungry services over the network.

While an iPhone might cost 400 times its weight in carbon to make and charge, estimates put the network impact of using a smart-phone at over a tonne and a quarter of carbon dioxide a year – over eight million times its weight.

Research studies estimate the carbon footprint of ***YouTube*** at around 100 $MteCO_{2(e)}$ per year – equivalent to the emissions of Chile, or the Czech Republic, or all of Eastern Africa.

For the broadcast services like **Netflix**, **Amazon**, or **iPlayer**, the impact could be more than 100$MteCO_{2(e)}$ per year *each*. 'Video-on-demand' is estimated to occupy 80% of the Net bandwidth: VoD services are a third of that; live streams & skype 20%; porn 27%.

The entire network now represents 4% of global CO_2 emissions. Growing at 8% per year, it will double by 2025, rising to 14% by 2040.

As with the manufacturing costs, the costs of running the phone are not directly associated with "the phone". Almost half is in the data centres used to serve and process data; another quarter is the infrastructure of towers and network switching centres.

In 2014, less than 16% of global e-waste was estimated to be recycled. Much of the rest went to landfill or incinerators, or was exported where dangerous informal disassembly operations threaten the health of local communities.

For mobile phones specifically, some studies say: only half are appropriately recycled; while others say it is 3%-5%; and some as low as 1%. Most disappear through the resale market, often to developing countries where they are broken up to recover metals in utterly inappropriate and polluting ways.

The fact that such a low number of phones are properly recycled, quite apart from the toxic ecological legacy that creates, has an incredible implication for their future use.

Of the 92 elements in the periodic table, around 60 are used in the manufacture of smart-phones. What exactly is in each phone can never be precisely known because of the complex web of manufacturing.

According to research by Plymouth University geo-scientists, to create just one 150 gram phone requires 10-15 kilos of high-grade ore. The problem is we're running out of high grade ores, and so that figure is beginning to grow on an exponential trend as we deplete metal resources – causing the footprint of the phone to grow further.

A smart-phone is about 40% metals, 40% plastics and 20% ceramics and resin. As well as the 'conflict minerals' tungsten, tin, tantalum and gold, phones also contain silver, nickel, cobalt, zinc, copper, arsenic, chromium and selenium – all of which can leak during disposal.

Unless recycled metals are used, they must all be mined, and this can mean communities are displaced, biodiversity destroyed, and large amounts of water and fossil fuels are used for processing and extraction.

The critical metals – the indium, gallium, germanium, rare earths, hafnium, platinum and palladium – are not recovered. The levels in the phone are lower than the levels found in natural source rocks. Consequently there is only an economic incentive to recover the gold, silver and copper.

5G will require many more base stations and servers. Per gigabyte 5G will be more efficient than 3G/4G – but because it will also expand data transfer potentially 100-fold, those savings will be more than erased by effect of expanding of the network.

There is no empirical research evidence that 5G has any health effects. *That is because they decided to go ahead with the 5G roll-out without doing that research first.*

What we can say with confidence, *because there is now a lot of good quality research available*, is that the existing 3G & 4G systems – and wifi – do cause a variety of health effects.

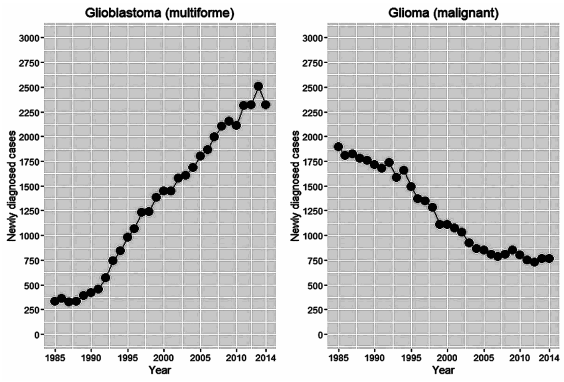
Just over a decade ago the Interphone study is found evidence of health effects amongst high-using groups. it recommended further research to identify this anomaly.

This led the US National Toxicology Program to fund a ten year, multi-million dollar study irradiating live rodents to see what effect it had. That study reported last year and clearly found evidence of one type of cancer – *gliomas*.

In Italy, the Ramazzini Institute carried out a separate study that reported after the NTP study. It was similar with one exception; they used lower power radiation. They still, however, observed similar effects to the NTP study.

Recently the levels of glioma brain cancers have been falling in Britain. However, since the 1990s, one particularly virulent type of cancer, *glioblastoma multiforme* (GBM), has increased consistently while the others fell.

As observed in a study published in the *Journal of Environmental and Public Health* in late 2018 there is no way of accounting for this; in the absence of specific data it merely cites a "modern lifestyle factor" as the cause. But GBM is the same kind of cancer found in the NTP and Ramazzini studies.



The change in GBM (left) versus other glioma brain cancers (right) in Britain, 1985-2014.

The only way to stop this self-inflating system of consumption is to to challenge the 'uncontested good' of technology.

Just as we talk about moving beyond the idea of 'GDP' measures of growth, so we have to talk about moving beyond the technological processes which have enabled both growth.

Unless we deal with the consumption treadmill of the digital technologies, we will not be able to address climate, or the growing levels of energy demand around the globe.