

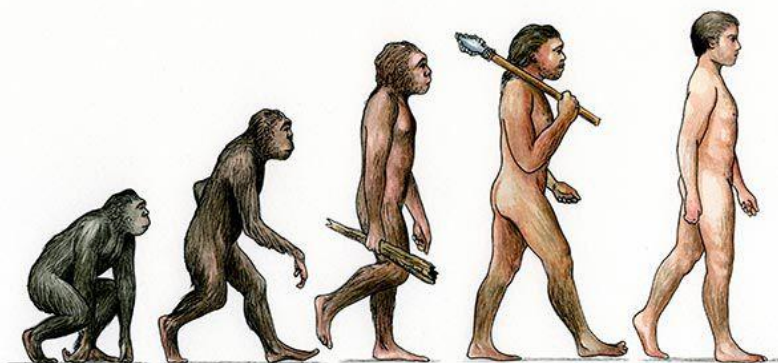
# SinglePlanetLiving2 – Energy Subsidy

August 2019

I started last January thinking I would find time to write pieces for this blog at fairly regular intervals, but life, the universe and everything got in the way of that noble intention, and so the second instalment is only surfacing now. Such is life.

There are many ways in which we humans are unique amongst the myriads of species on this planet. One that rarely gets mentioned is the fact that we require extra energy from nature, as well as our food. This is our energy subsidy. All other species get all they need through their “food”. For example most animals consume food through their mouths and they convert this internally into all the energy they need to keep them warm, to grow, to move and to generally operate all the systems in their bodies. For plants they absorb nutrients and water via their roots as well as taking carbon dioxide from the air which they convert to glucose and oxygen, and the energy they get from this they then use to operate all their internal systems and to grow. Like other animals we too consume food to give us the energy to run our internal systems and to grow, but then we also require further energy inputs from various sources in order to survive, such as clothing to keep us protected from the elements, and it is this extra energy that is unique to us – our energy subsidy.

When the upright apes from which we have evolved first appeared on the planet, they, like all other animal species, basically had no need of an energy subsidy apart from their food, but since then we have evolved to require this energy subsidy



for a variety of purposes. The first manifestations of this were probably in the form of making tools and weapons, and this further evolved into us making shelter and housing for ourselves, all made from materials we found in our environment, some plant derived such as wood, others mineral in nature such as stone. At some stage we significantly lost much of our fur, and this meant we then required clothing which would initially have come from animal hides, a by-product of our hunting the animals for food.

The first big leap occurred when we discovered how to light and control fires, and we used fires to cook our food and to keep our caves or housing warm,

particularly at night. The source of fuel for the fire was wood and other dead plant matter. All of this was completely sustainable long term, as we were just using materials that were abundant in our environment, many of them “waste” from other processes, such as the hides for our clothing and the sticks we gathered to burn.

The next big leap was the development of agriculture and the domestication of animals. This required us to store food long term, and keep it fresh and away from vermin, requiring an energy subsidy in the form of extra buildings and storage vessels, and also the development of tools for agriculture. Also with the domestication of animals like horses, camels and donkeys, we now had the ability to travel much further than we could previously on foot, and it also meant we could trade over longer distances, leading to the development of things such as the Silk Road. As we continued to evolve and “progress”, so the energy subsidy we required to live went up. In ancient times this was all perfectly sustainable as we were getting that energy subsidy sustainably from the environment directly around us.

As societies continued to develop and evolve, so the energy subsidy required increased. As we moved away from being purely a rural and agricultural people, and we started to develop cities and hierarchical structures in our society, so the energy subsidy required continued to rise. In the Roman Empire for example, much of that energy subsidy for the Roman elite came from slaves and servants. As we moved forward into the Middle Ages, so that subjugation of “lesser” people as slaves and servants by the elite continued, to provide them with the energy subsidy necessary to live the high life. This continued with the development of plantations for sugar and rubber in the “New World”, which required huge amounts of energy subsidy in the form of slaves imported from Africa.

Up until the Industrial Revolution, this was all quite sustainable from an environmental perspective, though a lot of the moral and ethical issues within society were far from sustainable. The key change that happened in the Industrial Revolution from an energy perspective is that we started to supplement and



replace the labour of humans and animals with energy from fossil fuels, first coal, and later oil and gas. The photo shows an early steam engine (Newcomen engine) in action. This is really the point at which it all started to become unsustainable from an environmental perspective.

The issue with fossil fuels is right there in the name – fossils. All fossil fuels are the ancient remains of large amounts of plants and animals that got trapped in a particular way at some point in geological time, and over millions of years the energy in their remains concentrated in such a way that it became a useful fuel for us, all those millions of years later. All living matter is based on carbon, and basically living things, particularly plants, take carbon from the atmosphere in the form of carbon dioxide, and turn it into other substances which trap the carbon in non-gaseous form.

Fossil fuels are full of this trapped carbon, and when we burn them, we release the carbon that was trapped from the atmosphere millions of years ago back into the



atmosphere again. This is the crux of the problem with our use of fossil fuels. Since the Industrial Revolution we have been releasing more and more of this carbon, which was removed from the atmosphere all those millions of years ago, back into the atmosphere again. We have completely overloaded the natural systems of the earth, so that the amount of carbon dioxide the natural systems can take out of the atmosphere are far exceeded by the amount we are pumping into the atmosphere, and so the amount of carbon dioxide (and other greenhouse gases) in our atmosphere is increasing unsustainably, and this has now reached a crisis point.

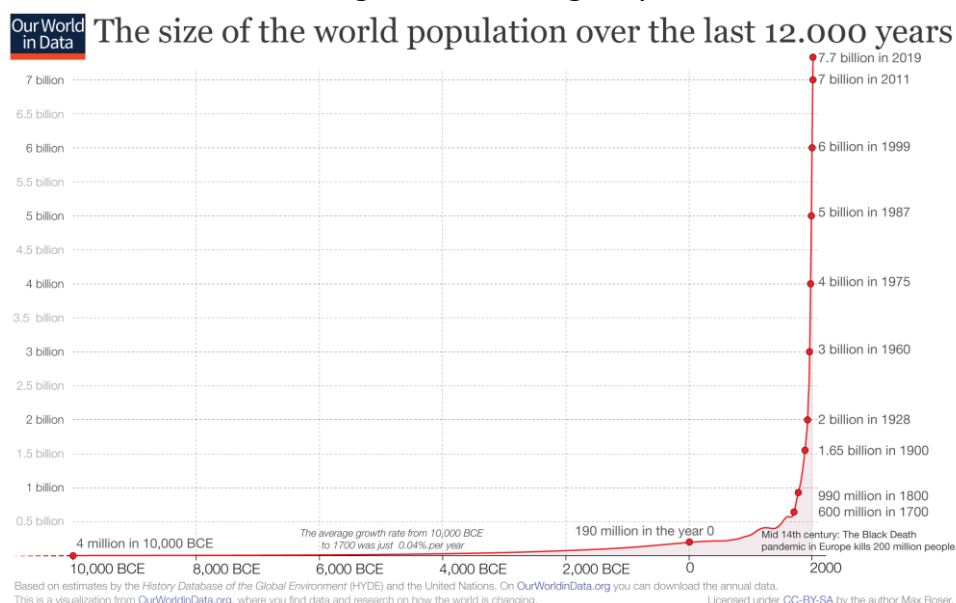
The challenge facing humanity now, and it is a truly enormous challenge, is to very rapidly change how we do things so that our energy subsidy is back within sustainable limits again. By sustainable in this context I mean that the amount of carbon dioxide and other greenhouse gases we emit is within the limits that the earth's natural systems can deal with, and that the amount of greenhouse gases are no longer increasing in the atmosphere. Nothing else has energy in such concentrated form as fossil fuels, but we have at this stage used a lot of them up, and must leave the rest of them where they are, in the ground. This means fundamentally re-examining literally everything we do, because everything we do requires an energy subsidy, and trying to do it in a way that minimises that energy subsidy. In reality this means that a lot of we do and take for granted in the modern world, we will simply have to stop doing, and very soon, as there is simply no way of continuing to do this in a sustainable way. I would put the aviation industry into this category, and I will deal with that in detail in another blog post very soon. Other things we do we will hopefully be

Renewable energy sources (wind, solar, water, etc) will be able to provide some of the energy subsidy we need into the future in a sustainable way, but they will not be able to provide an energy subsidy to us to anything like the extent that we are used to in the "developed" world. We simply have to reduce our



energy subsidy substantially. Those of us in the developed world are currently living as if we have 3 or 4 planets. We only have one. In energy terms, single planet living means we have to reduce our consumption of energy subsidy to a third or a quarter of what it currently is. This doesn't mean just turning off a few lights and using a bit less electricity. Everything we consume is embodied energy. We have to cut our consumption to only the essentials. We have to travel a huge amount less and better. We have to use way less energy in our homes: bye-bye tumble drier, bye-bye air conditioner and bye-bye a lot more gizmos and gadgets. If we humans are to survive on this planet in any sort of numbers, we have to live a hell of a lot smarter than we do today. And we only have a decade to make substantial changes. The emergency is now.

At the start of the Industrial Revolution there were less than a billion humans on the planet. The population is now approaching 8 billion, and is expected to rise to approaching



10 billion. This population explosion has been mirrored by an explosion in our energy subsidy. In many ways our population explosion is dependent on that energy subsidy. This leads to the thorny question: how many humans is planet

Earth able to sustain? I don't know the answer to that question, but I intend to return to explore it in detail in a later blog post.

For the moment, for there to be any hope of single planet living, we must develop a deep understanding of the energy subsidy we rely on, and the implications of that. There is energy in everything, and everything is energy. We must learn to live with a lot less energy. We must learn to live with a lot less of everything.