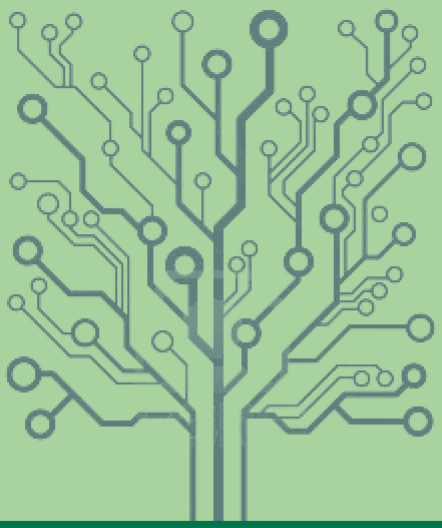
TECKIE-FIX?

THE INFLUENCE OF TECHNOLOGY



" Everything that's already in the world when you're born is just normal.

Anything that gets invented between then and before you turn thirty is incredibly exciting and creative and with any luck you can make a career out of it.

Anything that gets invented after you're thirty is against the natural order of things and the beginning of the end of civilisation as we know it until it's been around for about ten years when it gradually turns out to be alright really.

Apply this list to movies, rock music, word processors and mobile phones to work out how old you are". DOUGLAS ADAMS [1]

I have to admit to being a bit of a Luddite. If I have a choice of doing a practical job by hand or using a machine, I'll choose the labour intensive option. If we have to dig a hole here on the farm, I'll reach for the shovel and get cracking, while others will look for a technical solution. Depending on the state of the mechanical equipment at the time, my method can be quicker.

I enjoy knitting, spinning, crochet, reading, gardening, and walking. I have a mobile phone, but don't like using it. I feel I should set up a Facebook page, but really don't want to. I have tried and failed to understand the intricacies of alternative energy systems, but my mind just fuzzes over at the mere mention of watts, pixels and gigabytes (which begs the question - am I a Luddite or just an average woman?). Over the years, I've been involved in, what some would call technophobic, campaigns against genetic engineering, nuclear power, emissions from chemical companies, incineration and high voltage electricity pylons.

But the unfolding implications of climate change have begun to put manners on me.

Tucked away in our rural idyll here in West Cork, we could fool ourselves that the do-it-yourself philosophy will change the world, but looking at the scale of the challenges ahead, you just have to admit that technology is an essential part of the solution. Accepting the potential negative effects will test the mettle of many of us environmentalists.

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1 *Douglas Adams (1999); How to Stop Worrying and learn to Love the Internet http://www.douglasadams.com/dna/19990901-00-a.html*

THE POWER OF TECHNOLOGY

However you look at it, science and technology has had a huge impact on our western world. Advances in public health have more than doubled the average lifespan; the invention of nuclear missiles has made world scale war an unattractive and suicidal option; birth control has spared women from years of childbearing, enabling us to take our place in the work-force, and has helped to subdue population growth in the west; agricultural developments have staved off mass hunger; electronics have connected humankind; cheap transport has brought travel to the masses; we have even made it to the moon and back.

Over the ages, inventions like the wheel, the printing press, the spinning jenny and the railroads have had immeasurable impacts on how society has developed and on how we now live.
Some much hailed developments were doomed to fail, however, and have been erased from historical memory - remember the plank road, anyone?

The Plank Road [2] - An American engineer named George Geddes believed he had come up with the solution to the muddy/dusty rutted dirt roads which plagued early 19th century travellers, consisting of wooden planks laid over two lines of timber. He reckoned that a plank road would last eight years, which would allow enough time to gain a reasonable return on the investment via tolls. The first road was laid in New York in 1846, and was deemed a roaring success, so much so that plank-road fever soon set in. Within a decade there were 352 companies in New York and over a thousand in the USA overall. But unfortunately, the whole business was built on an illusion. Plank roads lasted for less than five years, not the eight as predicted, and companies soon realised they could not afford the maintenance. Within a decade it became clear that the plank road was not going to be a transportation panacea, and most were unceremoniously abandoned.

On the other hand, a little invention like the standardised screw has had an untold influence on the roll out of mass production, the printing press has done its bit for the dissemination of information, education and intellectual freedom, the elevator has played its part in allowing greater concentrations of people to live in one place, and therefore the development of mega cities.

The Standardised Screw [3] - Up to the 1860s, every screw had to be hand-made by a machinist. This limited the possibilities of mass production but also secured the machinist's trade and way of life. Then came the American machinist, William Sellers, prominent and respected in his field. He designed a standardised screw and then set out on a campaign to get America to adopt it. Over the next five years, Sellers targeted influential users, like the Pennsylvania Railroad and the US Navy. Within a decade, the screw was on its way to becoming a national standard, which helped to lay the groundwork for modern manufacturing.

The Printing Press - By the middle of the 15th century, the printing press emerged to allow for the cheaper production of books, mainly thanks to the work of Johannes Gutenberg, a German stonecutter and goldsmith. In 1452, Gutenberg began his famous Bible project, and two hundred copies were printed. By 1500, the invention had gone viral and over 2,500 European cities had acquired printing presses. Books and pamphlets became accessible to the wider population, who were eager for information of any kind. Printing also facilitated the dissemination of and preservation of knowledge in a standard format. The printing press of its time, ushered in as much of a revolution as has the internet of today.

The Elevator - The elevator itself has been around for centuries - apparently Archimedes built one 2,200 years ago. However, for it to usher in the building of skyscrapers which now dot the skyline of most large cities, it needed a good source of power and had to become safe. The early steam engines were used to run industrial elevators, which were either pulled up by a rope or pushed up hydraulically. As engines

2 *James Surowiecki (2004) The Wisdom of Crowds-why the many are smarter than the few; p. 52*
3 *Ibid p. 55*

improved, so did the speed and power of elevators, which could haul massive amounts of coal out of mines or grain from boats. But it wasn't until Elisha Graves Otis invented the safety brake in 1853, that people felt they could travel long distances upwards without the fear of hurtling back down again. The elevator industry began and by the 1880s, allowed the path-breaking structures of 10 stories, like the New York Tribune building and St. Pancras Station in London to be built. Further into the decade, the load-bearing steel skeleton was developed and true skyscrapers began to emerge on urban landscapes.

Other break point innovations such as Watt's steam engine, Edison's power grid and electricity delivery system, and Ford's cheap and efficiently produced Model T. car, and then more recently the Internet, mobile phones, and iPods have moved society forward, sometimes surprisingly rapidly.

But at the same time, there have also been down-sides to many of our technological advances: the eradication of many trades and crafts; the speeding up of our pace of life; the creation of urban sprawl and rural decline; the pollution of our air, land, rivers and seas; the extinction of many of our wild animals and a decline in overall species diversity; the destruction of many of the world's forests; the warming of our planet and consequent climate change.

And what of the promises - did nuclear power make electricity too cheap to meter? Has the computer or the mobile phone given us more free time? What about the paperless office? Now that we have washing machines, are we not just doing more washing? What are we to make of stepping from office elevators into our cars and driving to health clubs to use treadmills (a feature of nineteenth-century prisons) and stair-climbing machines? How come many people in the most technologically advanced countries are suffering from obesity and/or depression?

Edward Tenner[4] makes the point that technology is not always as simple a solution as it might seem, or the panacea to all ills and we should beware of relying on it to solve all our problems.

Technology can demand more, not less, human work to function properly. *"And it introduces more subtle and insidious problems to replace acute ones. Nor are the acute ones ever completely eliminated; in fact, unless we exercise constant care and alertness, they have a way of coming back with new strength. We are on a treadmill that we can no longer dismount from. We cannot turn back to a wholesome past, if only because the past, while sometimes decorous, was far messier than we realise or perhaps can realise. A whole book could be written about mud, and another about dust."*

THE POWER OF OIL

The development of technology has always occurred on the back of an energy source. For centuries, human strength and labour (often involving slavery) provided what was required. The more humans available the more that could be built or produced.

Over 6,000 years ago, human beings began increasing their energy appetite when they first yoked the ox and used its power to till fields and draw water from wells. Then came whale oil, coal, steam and the panacea to all our ills, oil and gas.

Oil is sometimes called black gold because, in relation to its volume and weight, it releases so much more energy than other substances, and most importantly, gives us such a bang for our buck.

4 *Edward Tenner (1996) Why Things Bite Back – Predicting the Problems of Progress; Preface*

Three large spoonfuls of crude contain about the same amount of energy as eight hours of human manual labour.

When we fill our cars with petrol, we're pouring into the tank the energy equivalent of about two years of back-breaking digging (I can feel the pain). No other fuel comes close to matching its properties. As petroleum geologist Colin Campbell, a resident of Ballydehob in West Cork, and founder of The Association for the Study of Peak Oil (ASPO), puts it - *"it's as if each of us had a team of slaves working for next to nothing"*.[5]

The discovery of oil ushered in a whole raft of technological innovations, each of which has now become an accepted and required part of our daily lives - the car, the jumbo jet, elevators, central heating, air conditioning, container ships, synthetic fertilisers. We expect to be able to drive miles to work, to visit our relatives in Australia, to wear T-shirts in winter and to live 30 floors up a skyscraper. We aren't happy if our package doesn't arrive on time or if the supermarkets aren't stocked with fresh produce. What used to be a luxury is now a necessity. An increasing number of us are now used to a lifestyle which uses a lot of energy, and we're not going to give it up lightly.

Peter Tertzakian[6] claims that the First Principle of Energy Consumption means that the better off we are, the more energy we use. So the wealthier we become, the more our energy use will increase and vice versa.

Globalisation has flourished on the back of cheap energy, so now the world seems truly flat. A sales call from an Irish phone company wings its way over from Bangalore, our kids' toys have come from a conveyor belt in China, and the sad little chicken breasts on the menu were once clucking around a massive factory in Thailand. Our standard of living has increased over the past 20 years, thanks largely to the availability of these low cost goods from countries where labour is cheap. And the manufacturing countries have also done well out of the deal, with money pouring in, to be spent on cars, housing, heating and air-conditioning. Furthermore, nations like China or India understand that an appetite for energy is the fundamental way to achieve the American Dream, a dream they now wish to share in themselves. Regardless of the financial crisis, they want what we have, and they know that they need reliable, plentiful energy to get and maintain it. And who are we to say they can't have it? Especially if we also want to see world poverty eradicated and population growth curbed.

The accepted mainstream answer to continuing poverty levels in developing countries is economic growth and improved standards of living; the answer to increasing population is economic growth, education of women and improved standards of living. Both will involve more energy use.

But burning coal and oil or, to a lesser extent, gas is a major problem for climate change. Bearing this in mind, can new technology bring us back from the brink?

ALTERNATIVE ENERGY

The UK physicist David J.C. MacKay[7] details exactly how much alternative energy can realistically be produced by Britain and he then compares it to how much energy is presently used by the country's population. The one ethical position he says he wishes to push is that *"we should have a plan that adds up."*

MacKay has established that the UK's present lifestyle cannot be sustained on its own renewables, without the industrialization of country-sized areas of land and sea. So, he concludes that, if the country wants to get off fossil fuels and live sustainably, the options are to balance the energy budget, either by reducing demand, or by increasing supply, or, of course, by doing both. And he says no one should have any illusions. To achieve the goal of getting off fossil fuels, these reductions in demand and increases in supply must be big. *"Don't be distracted by the myth that every little helps. If everyone does a little, we'll achieve only a little. We must do a lot. What's required are big changes in demand and in supply."*

5 *T Homer-Dixon, Thomas The Upside of Down; p.83*
6 *P Tertzakian (2009) The End of Energy Obesity; p. 6*
7 *David J.C. MacKay (2009) Sustainable Energy Without Hot Air www.withouthotair.com*

Demand for power could be reduced by cutting down population, by changing our lifestyle, or by keeping our lifestyle but reducing its energy intensity through efficiency and the use of new technologies.

And MacKay concludes that power supply could be increased by electrifying transport, which is more efficient than using fossil fuels. To supplement solar-thermal heating, most heating of air and water in buildings could be electrified using heat pumps, which are four times more efficient than ordinary electric heaters. All the green electricity could come from a mix of the following sources: from the country's own renewables; perhaps from "clean coal;" perhaps from nuclear; and finally, from other countries' renewables - solar power from deserts being the most plentiful option.

(David MacKay wrote this in 2009. Apparently, falling costs since then may mean that solar can now be financially viable in the UK itself)

Chris Goodall[8] says he doesn't claim that the world will painlessly escape from the shackles of fossil fuel dependence by quickly and cheaply building a low-carbon economy, but he wants to demonstrate that however difficult the transition might be, the world has the tools it needs to tackle climate change and there are huge technological improvements to come that will reduce the price of low-carbon energy to a fraction of what it is today.

However, he states that most of the technologies are still in their infancy, and although their prospects seem bright, none will advance rapidly without large amounts of risk capital, consistent and expensive support from governments (and therefore also from their electorates in democratic societies) and continued scientific advances.
He claims that almost all the technologies will have to go through the following phases: an expensive and inconvenient introduction; a troubling period in which enthusiasm wanes and improvements appear to be slow; gradual acceptance by sceptical purchasers; and eventually, a dawning sense that we really can do without the fossil fuel alternative.

Goodall lists the following obstacles to widespread adoption of the new technologies:

- The existing infrastructure of natural gas and oil pipelines, storage tanks, electricity distribution grids, huge coal and oil fired power stations, and distribution network refineries and petrol stations has been developed for the use of fossil fuels. It won't be easy to switch away from this and create a new infrastructure and distribution system.
- Our lives are currently structured around instant and consistent access to energy. The electricity service in developing countries offers nearly universal access and reliability. It is unlikely that low-carbon technologies will be able to match this reliability within the first few years. We will go through periods when the new technologies fail, provide only intermittent supply, and cost more than their fossil fuel equivalents.
- Already some industries are experiencing component shortages. (The availability of Neodymium is a problem for some generators and efficient motors. Electric cars may be held up in the longer term by shortage of minerals, such as cobalt required to make their large lithium batteries). Because of these bottlenecks and interruptions of supply, the transition will be slower and more uncomfortable that we might have hoped for.
- Micro-renewables, such as on-farm wind turbines are all very well in their own right, but they are far more expensive for each unit of carbon saved than their full-scale equivalents. There needs to be large scale implementation of the technologies. We need corporations that can invest tens of billions of dollars every year in huge projects in every country in the world. Goodall, writing in 2008, felt this also applied to solar panels - however, since then roof-based panels have become much more economical

8 *Chris Goodall (2008) Ten Technologies to Save the Planet; p. 1-5*

- While the free market will be very useful in deciding which potential technical innovations offer the best opportunities, it will probably not give us the tight integration of various complementary technologies that the world needs. The energy supply in each country will need to be carefully planned by a central authority, particularly as incentives are required during the formative stages.
- The world will have to very carefully decide how to allocate land between the various competing uses - food production; growing woody biomass for ethanol and for the fuel in combined heat and power plants; taking carbon out of the atmosphere by digging charcoal, made from wood and plant matter into arable soils; planting forests as carbon sinks

FOSSIL-FUEL LOCK-IN

Fred Pearce[9] points out that changing course is really hard. Part of the problem is the vast infrastructure dedicated to sustaining the supply of coal, oil and gas. The problem is political in that the fossil fuel industry wields a lot of power, particularly in Washington. It is also commercial – heavy investments in fossil fuels have reaped big profits for shareholders, which leads to more investment in the profit-making technologies. The result is *"domination by an outdated energy system that stifles alternatives"*.
The alternative energy revolution is often compared to the IT revolution of 30 years ago, but Pearce points out that all IT had to fight against were armies of clerks.

Another form of lock-in is more mental than physical.[10] Despite destructive sea storms, the attraction of beachfront life and tourism means that these areas will be re-built, only to be at risk of future storms. Unless people are forced to re-locate they will most probably choose to re-build in the same areas, and most houses won't be brought to storm-proof standards as people rush to resume normal life.

Trying to move ports, industrial area or communities will be no easy task and will require new laws and new thinking.

It is expected that hazard zones will not be vacated through government regulation, but when insurers and investors can no longer stomach the risks.

EMERGING TECHNOLOGIES RARELY BEHAVE IN THEIR EARLY YEARS

Boeing decided over a decade ago to create a passenger airliner, which would emit less CO2 and nitrogen oxide. They saw this as representing the future of air travel, using 20% less fuel than similarly heavy aircraft. The US company ambitiously called the new 787 the Dreamliner and invested more than $20bn (£12.8bn) in it. The plane was launched in late 2011 after a three-year delay. The design included a lightweight plastic fuselage and an all-electric, rather than hydraulic, control system. The Dreamliner was the first to use only carbon-fibre-reinforced plastic, rather than the tried and trusted aluminium alloy. Boeing chose cells based on lithium cobalt oxide, which are extremely light and powerful, but also very flammable.

"Having followed the plane's tortured development and path to airworthiness certification....for more than a decade, it was clearly only a matter of time before something went wrong", wrote New Scientist's Paul Marks.[11]

9 *Fred Pearce; New Scientist; 26th Jan 2013; p. 26/7*
10 *New Scientist; 5th Jan; p. 7*
11 *Paul Marks; You're Grounded; New Scientist; 9th Feb. 2013; p.28/9*

According to Marks, the reason is simple - the Dreamliner probably incorporates the broadest collection of untested aviation technologies since the Wright Flyer lifted off the beach at Kitty Hawk in 1903.

On 7th January a fire broke out in one of the batteries in an empty Dreamliner at Boston's Logan airport. Shortly after, a battery in a second plane malfunctioned in flight, resulting in an emergency landing and evacuation at Takamatsu airport in Japan. These battery scares led to the grounding of Boeing's 50-plane Dreamliner.

Nevertheless, Boeing says that it remains confident in the 787 and has more than 800 outstanding orders for the jet, including from Virgin Atlantic and British Airways.[12]

Peter Tertzakian[13] suggests that renewables merely represent a nice side dish to the overall diet, not a main course. We shouldn't be looking for a "magic bullet".

Tertzakian says that for an entire society, or even a significant proportion, to undertake the mass-market adoption of a new energy system, it has to be convinced that what's new is truly compelling. An energy system is compelling if it is flexible and versatile (can be widely used in different ways); scalable (able to deliver large amounts of energy); storable and transportable; deliverable (we like our energy to be there when and where we want it); energy dense (remember, three spoonfuls of crude oil equals eight hours of manual labour); power dense (an average sized Boeing 747 jet engine puts out the same amount of power as 125 acres of solar panels); environmentally sensitive; secure (in an increasingly turbulent and uncertain world); sustainable (how much energy does it take to produce the energy).

Pushing oil off the table is incredibly difficult. Not only does oil prove robust across nearly every criterion above, it is startlingly cheap for the work that it does to power our prosperity and way of life.

Although Tertzakian believes that renewables and alternative energy solutions will have an important role to play in augmenting tomorrow's diet, he says that no technological advances within the energy industry will ever provide us with as much leverage for solving our energy problems as reducing consumption. He predicts that technology and creativity will instead yield new break point innovations and help us to move away from our reliance on energy altogether.

However, as Tertzakian[14] states, technological convergences must often be accompanied by social convergences to have truly significant impact, and the social realm is our greatest weak point, our most uncertain vulnerability. Will we be able to catalyse enough action on the social, political and business fronts to step through the doorway that new technology has opened?

There is no doubt that any transition to renewables will not necessarily be smooth. Serious lessons have already been learnt from our bull-headed rush into producing biofuels from corn and other food sources, resulting in farmers growing crops for fuel rather than food. Farmers switched because the price was better. Scarcity made the price of food rise and very quickly, this resulted in food queues and riots in some parts of the developing world. Apparently, the corn required to fill an SUV tank with bioethanol just once could feed someone in Africa for a year.[15]

And the cultivation and processing of corn in particular takes a large amount of energy, resulting in additional greenhouse gas emissions. Cultivating soya or palm oil can also add to global warming if rainforest is cut down, or peat bogs drained to provide the land in which to grow the crops.

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12 *http://www.telegraph.co.uk/finance/newsbysector/transport/9856622/Regulator-questions-Boeing-Dreamliner-tests.html*
13 *Peter Tertzakian (2009) The End of Energy Obesity; p. 99*
14 *Ibid; p. 248*
15 *Fred Pearce; Time to Bring in Plan b for Biofuel; New Scientist; 21 June 2008; p. 30/1*

Now, the more sustainable plan is to create second generation biofuels made from inedible plant material that can be grown on unused land or from plant or organic waste such as corn straw, wood chips or the contents of landfill - such material will not require much cultivation. However, the manufacturing process is 50% more expensive, so the challenge is to find ways to cut costs.

And promises don't always come to fruition. We have to be careful about promising the earth. Many grandiose but unsubstantiated claims have been made over the past few years about the potential of hydrogen to replace fossil fuels as an energy carrier. In the US, George Bush and the large car manufacturers touted fuel cells as the long awaited replacement for the internal combustion engine, but the date of commercialisation for those automotive fuel cells keeps slipping away.

On the other hand, in many countries, renewable energies, albeit starting from a low base, are certainly expanding their share of the market.

- By the end of 2012 wind energy covered more than 30% of Denmark's electricity consumption and the country is thus still well on its way toward the target of 50% wind energy in 2020, and remains the country in the world that has the highest share of wind energy in the electricity system [16]
- The contribution of renewable energy to overall energy demand In Ireland rose from 2.3% to 5.6% between 1990 and 2010, and reached 6.5% in 2011. Ireland's target is to achieve 16% by 2020 under EU Directive 2009/28/EC. We have a target of 40% for electricity production by 2020. In absolute terms the total use of renewables nearly trebled between 2003 and 2011 (16% annual average growth) to 747 ktoe, largely due to the increasing contribution from wind energy.[17] As of July 2012, 14.5% of Ireland's electricity was being produced by wind energy.
- In April 2012, it was reported that only 3% of the UK's energy was coming from renewable sources, such as sun and wind, compared with a European average of 12%, despite a series of high-profile government policies aimed at increasing that percentage. Britain is committed to producing 15% of its energy from renewable sources by 2020.[18]
- About 9% of all energy consumed in the United States in 2011 was from renewable sources, and they account for about 13% of the nation's total electricity production.While a relatively small fraction of the US's overall energy supply in 2010, the United States was the world's largest consumer of renewable energy from geothermal, solar, wood, wind, and waste for electric power generation using some 25% of the world's total. In 2011, the distribution of U.S. renewable consumption by source was: Hydropower 35%; Biomass Wood 22%; Biomass Waste 5%; Biomass Biofuels 21%; Wind 13%; Other 4%[19]
- As of mid 2012, renewables comprised 25% of Germany's total energy production, a 4% increase from the previous year. The largest renewable source was wind energy, accounting for 9.2% of all energy production. Solar energy saw an increase of 47% over the previous year, coming in at 5.3% of all power production. Germany is the world's largest producer of solar power, its "installed capacity" representing more than a third of the world's total.[20] Germany is aiming to produce 80% of its power from renewable sources by 2050.
- China was responsible for almost one-fifth of total global investment, spending $52 billion on renewable energy last year. The United States was close behind with investments of $51 billion, as developers sought to benefit from government incentive programs before they expired. Germany, Italy and India rounded out the list of the top five countries. According to China's 12th Five-Year Plan for Economic and Social Development (2011-2015), the country will spend $473.1 billion on clean energy investments over the next five years. China's goal is to have 20 percent of its total energy demand sourced from renewable energy by 2020 [21]

16 *http://www.windpower.org/en/news/news.html#727*
17 *http://www.seai.ie/Publications/Statistics_Publications/Renewable_Energy_in_Ireland_2011.pdf*
18 *http://www.guardian.co.uk/environment/2012/apr/21/missed-renewable-energy-targets-uk*
19 *http://www.instituteforenergyresearch.org/energy-overview/renewable-energy/*
20 *http://www.businessinsider.com/germany-renewable-energy-production-is-living-up-to-the-hype-2012-7*
21 *http://www.forbes.com/sites/jackperkowski/2012/07/27/china-leads-the-world-in-renewable-energy-investment/*

DILEMMAS FOR THE GREENS

Technological responses to climate change are posing new and difficult questions for the green movement. A cursory trawl of the web will uncover some very tetchy arguments going on between prominent campaigners, particularly on whether nuclear power is an antidote to fossil fuels. And it's good that these discussions are happening – it's not good if they just turn into yet another fight. Let's not forget in the 1980s, Margaret Thatcher reputedly won her battle against the coal miners when they began scrapping amongst themselves.

Hard though it may be, we do need to take time to reflect on our stance on such issues as wind farms, nuclear power, high voltage lines, fracking, infrastructural projects for energy storage, solar parks, tidal barrages and the like, and to make our campaign decisions, if possible, with the bigger picture in mind.

In an article in 2009, Fred Pearce[22] acknowledges the tough choices being faced by environmentalists and he believes the problem is one of scale. *"Bigness is often an issue for greens, many of whom grew up reading one of the movement's key texts: E. F. Schumacher's Small is Beautiful. They liked biofuel while it was about recycling cooking fat, but not when it became growing millions of hectares of palm oil in former Borneo rainforest. Solar panels on roofs are good, but covering entire deserts with them is another matter. They like small wind turbines and even small wind farms, but get very jumpy as wind power reaches industrial scale.*

Small may be beautiful, but it won't change the world. You can't generate vast amounts of green energy without large-scale engineering projects, which inevitably do some damage to the natural environment."

Pearce outlines a number of contemporary examples:

1. The UK government has committed $14 billion to a tidal energy project which should replace the equivalent of eight coal-fired power station, by building a giant 16-kilometre barrage across the Severn estuary on the west coast of Britain. Friends of the Earth said it *"will wreck one of the most important wildlife sites"*, and the Royal Society for the Protection of Birds said the *"massively damaging proposal cannot be justified"*. On the other hand, the UK's Sustainable Development Commission, chaired by former Friends of the Earth Director, Jonathon Porritt, came out in favour of the barrage - saying that the enormous potential to reduce carbon emissions outweighs the environmental harm.

2. Plans for 10 wind farms off the coast of Scotland received a preliminary go-ahead in 2009, but Scottish waters contain 45% of Europe's breeding sea birds, many living around the reefs and shallows favoured as wind farm sites.

3. In the US, the 130-turbine Cape Wind project on Nantucket Sound, off the coast of Massachusetts, promised to be America's first off-shore wind farm, but delays were caused largely by objections from local residents, including the Kennedy family, who say their view of the ocean would be spoiled. Greenpeace organised street protests against Robert Kennedy Jr., an environmental lawyer and opponent of the project. (The project has since been approved)

In the UK, well-known environmentalists David Bellamy and James Lovelock are leading the revolt against wind farms. And here too in Ireland, resistance to the siting of some wind farms is coming from local residents and environmentalists and ad hoc community campaign groups.

[22] *Fred Pearce; Lose This or Build Eight Power Stations; New Scientist; 18 April 2009*

Local groups are also campaigning against plans to construct a high voltage power line through the centre of Ireland, required to strengthen the interconnector with Northern Ireland and improve our internal grid. And it is to link us up to a trans-European grid which will combine wind, hydro and solar energy across a larger jurisdiction so that, for example, when the wind isn't blowing in Ireland, we can import surplus solar power from Spain or wind power from Scotland. However, some environmentalists and local people are concerned about potential health effects caused by living close to the overhead powerlines.

As Pearce puts it, *"The bottom line for greens is that these dilemmas and contradictions are the fruits of success. And the more successful their arguments for cutting greenhouse gas emissions are, the greater and more frequent will be the dilemmas. Rarely will there be a right or wrong answer. All visionaries imagine that once they get their way, it will be plain sailing. It rarely is."*

FRACKING

The US has led the world in extracting gas from shale, "fracking", but interest is now spreading elsewhere - a number of projects have been proposed for Ireland. The British Geological Survey recently estimated that the UK has 150 billion cubic metres of shale gas, about half of its more conventional reserves.[23] Fracking has had some bad press with the main concerns being earthquakes and the contamination of groundwater with gas and chemicals. And some of the worries are justified. Badly managed fracking did contaminate water wells in Wyoming. In April 2011, Blackpool was struck by a 2.3 earthquake that was clearly the result of fracking. People say it is difficult to obtain scientific peer reviewed research on the pros and cons of the new technology.

The Oxford University economist, Dieter Helm's book *The Carbon Crunch* calls for climate crusaders to get behind the much hated new fossil fuel. In a review for New Scientist,[24] Fred Pearce says that the book is a powerful and heartfelt plea for hard-nosed realism. Helm, no closet sceptic, but an economist with a distinguished pedigree on climate change, calls for climate campaigners to support shale gas as he says the most urgent need is to banish coal burning – and any other fuel is better. Bearing in mind the urgency of the situation, Helm feels the installation of wind turbines and solar panels in Europe has caused more harm than good, by diverting research money, and pushing up prices and causing industries to re-locate. To him, the obvious answer is shale gas, which produces only half the carbon emissions of coal. Thanks to new drilling technologies we now have huge reserves of cheap shale gas around the world and can use it as a bridging technology.

The US's dash to exploit shale gas cut its carbon emission by 1.7% in 2011.

Helm says a ban on shale gas production will only push up coal production, the worst of all possible outcomes.

But his stance is controversial, and there are those who will argue that shale gas will actually squeeze out renewables. But Helm insists that this is both the cheapest and quickest way to cut emissions. According to Fred Pearce, the book suggests a worrying truth - *"that the environment movement is often more interested in pursuing a soft-focus vision of a greener world that in actually fixing climate change".*

As someone who would hate to live near a fracking site (or a nuclear power plant for that matter), do I fall into the soft focus category?

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23 *The New Scientist; 28th Jan. 2012; p.9/10*
24 *The New Scientist; 17th Nov. 2012; p, 51*

THE US MILITARY

We greens may also have to accept that the driving force behind the roll-out of alternatives may not be civil society but the US Military.

If the US military were a country, it would be the 35th biggest consumer of oil in the world. Its daily demand for nearly 45 million litres of crude is larger than Sweden's national consumption.

This reliance on oil is a threat to the security of troops and contractors who transport the fuel to the bases. But it is also poses a risk to the long term existence of the military when the oil runs out.

This is why the Department of Defense has set a goal of supplying 25% of the military's energy from renewable sources by 2025. The navy is even more ambitious, setting a target of 50% renewable by 2020.[25]

If the military meets its targets, it could transform the energy landscape to everyone's benefit. The power of the Pentagon's procurement machine should not be under-estimated. If it decides to pump money into alternative energy, the sums suddenly look more appealing. And the military establishment has form. It is responsible for giving the internet and GPS technology the kick-starts they needed at the beginning.

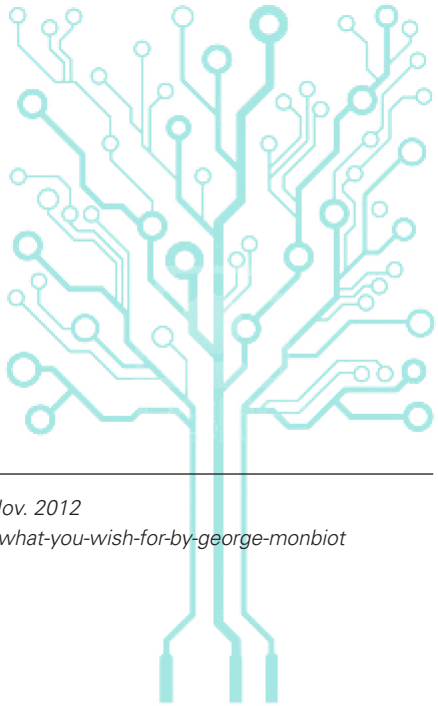
Some argue that the military's involvement could also help to break down scepticism about climate change in the US. However, so far, Republicans are fighting any moves by the Pentagon to buy any energy that might cost more than conventional sources.

NUKES?

While it looks like nuclear in the UK may have hit a wall,[26] the arguments for and against, when you take fossil fuels and greenhouse emissions into account, are still worth reading and pondering over.

In 2009, author, journalist, and long time campaigner, George Monbiot controversially declared that he would no longer oppose nuclear power.[27]

The following is an e-mail debate he had with anti-nuclear campaigner, Theo Simon.
http://www.monbiot.com/2012/10/09/the-heart-of-the-matter/



25 *Sarah Reardon; Eco-Warriors: The Next Wave; New Scientist; 3rd Nov. 2012*
26 *http://www.zcommunications.org/the-end-of-nuclear-power-careful-what-you-wish-for-by-george-monbiot*
27 *http://www.monbiot.com/2009/02/20/nuked-by-friend-and-foe/*