

THE UK AND THE WORLD IN 2050

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Introduction

WHATEVER WILL BE WILL BE

In 1898 a writer named Morgan Robertson published a short novel about the building of the world's largest passenger liner. It was over 800 feet long and deemed "unsinkable" because of its system of watertight doors. Because of this it carried the minimum number of lifeboats, insufficient for all of its passengers.

On its maiden voyage across the Atlantic between Britain and the US the crowded ship struck an iceberg and sank with great loss of life. Robertson called the ship "Titan."

When the Titanic went down 14 years later in strikingly similar circumstances, many people assumed that Robertson's novel was the result of precognition, a psychic ability to predict the future accurately.

The reality is less remarkable. When Robertson wrote towards the end of the 19th Century, people were building bigger and bigger steamships. Isambard Kingdom Brunel had built more than one "biggest" ship. It was only a matter of time before someone would build the biggest ocean liner ever. Such a ship would not be wasted

on plying between the nearby islands offshore from the UK. It would ply the lucrative and prestigious Blue Riband route between UK ports and New York, as the Queen Mary 2 still does today.

“Biggest liner safely completes maiden voyage” is not a riveting plot line, so Robertson needed an accident. There was a realistic choice of three. There could be a collision with another ship, maybe in the dark and fog. There could be a catastrophic boiler explosion that wrecked the ship. Or the ship might hit an iceberg and sink, as some ships did. He chose the iceberg.

Of course, when you launch a new ship, it has to have a name. If it is the biggest, you want a name that conveys that. It could have been Hercules, maybe, or Atlas, or Titan. When the US built its first giant intercontinental ballistic missiles in the 1950s, it called one Atlas and the other Titan. Robertson called his ship Titan.

What seemed at first like an uncanny ability to predict an unknown future turns out to be somewhat unremarkable. Current trends were followed and projected into the future. Reasonable assumptions were made about how that future might turn out. Robertson had some things right, but was wrong about others. His Titan sailed in the other direction for its maiden voyage, for example. The similarities are more interesting than the differences, though, because they show how intelligent projection can give you a glimpse, albeit a partial one, of how the future might turn out.

More to the point, they enable you to prepare for it so it does not stun you with its strangeness as it unfolds. And even more to the point, intelligent prediction sets out what might be possible, and in the process could encourage people to set about doing what it takes to bring it about, or to prevent it. Intelligent prediction, therefore, can have something of the flavour of a self-fulfilling prophecy for the good

that is predicted, and a self-negating prophecy for what is bad. If the owners who commissioned the Titanic had paid more attention to Robertson's book, they might have given it more lifeboats.

GREAT NUMBERS

Many of the big things, the big number projections for long term trends, show a remarkable consistency. There are several human, economic, and personal trends that are quite steady over the long term. There might be spikes up and down, but standing back and looking at the big picture, distinct patterns emerge.

One is the gradual growth of the economy. For about a hundred and fifty years it has been about two percent per annum - this is even including the years of the Great Depression. If anyone had attempted to predict midway through the Twentieth Century how the economy would go in the next sixty-five years, even with the recession of the early 70s, and even with the oil shocks, even with the financial crisis of 2008, he or she would have guessed it pretty well right if they had used the long-term numbers.

This kind of thinking enables people to rise above short-term crises and see beyond them to the future that unfolds and puts current events into perspective. Many people concern themselves with the here and now, and fail to take the long-term overview that diminishes the impact of the present. People worry that current or recent events mean that the world has changed forever, and that new rules and new paradigms make the future unrecognizable from the past. Some people become rich by writing books about a doomsday scenario they claim to see unfolding. The reality is that the long-term numbers often reassert themselves, reducing what appeared to be a world-threatening crisis into a statistical blip.

Life expectancy is one of those long-term trends. It has been increasing by several percentage points every decade. People could have predicted it correctly from the mid Twentieth Century. Indeed, some almost certainly did. Similarly, child mortality has been going down ever year at a steady rate. One could have added that to the list of predictions that could have been made successfully. Even the much regretted rise in the divorce rate could have been foreshadowed.

LITTLE THINGS MEAN A LOT

The problem is that the big numbers do not tell you what the future is going to feel like. To look ahead to Britain and the world in 2050 is to look ahead 34 years, just as the book George Orwell wrote in 1948 was about a Britain and a world set 36 years into the future. Leave aside the obvious point that Orwell's book was about the past, more about the Soviet Union of the 1930s than it was about the year 1984. It is instructive to note how different was Britain's 1948 in which he lived, from the way Britain's 1984 actually turned out to be.

If a person from 1948 could have travelled through time to the world of 1984, they would have been completely awestruck. Everything would have been unfamiliar: they would have been strangers. They could have predicted the big numbers about the economy and life expectancy, but they would not have prepared them for the utterly strange world in which they found themselves

They would have looked uneasily at the changes. There were no coal fires in 1984, for example, whereas nearly every room had one in 1948. They would have seen new and unfamiliar vegetables on the plate. People would have talked about jobs that did not even exist in 1948, jobs such as management consultants and public relations specialists. They would have heard children chatter happily about wind surfing

and hang gliding, both unknown 36 years earlier. The visitor from the past would have looked on in wonder at the microwave oven and the video recorder, speculating what they might have been for.

If someone from 1984 were somehow projected in the world of today, 32 years later, they would be equally confused. They might look at a smartphone and wonder what it was. The movie “Wall Street” was not to appear for a further 3 years. It portrayed Michael Douglas as Gordon Gekko on a beach wielding the ultimate in luxury: a mobile phone that was about the size of a brick. Even if they did work out that people could make telephone calls from a smartphone, the person from 1984 would be awestruck to learn that the tiny instrument was also a record player, tape recorder, CD player, DVD player, computer, radio, television, camera, video camera, calculator, flashlight, and a whole lot more besides. In their day it would have taken half a roomful of junk to do all of those things, yet here it is today in someone’s pocket.

It is these little things which give life its flavour and feel. They would all seem utterly strange to someone from the past. When anyone, therefore, tells you that you can predict the future from the big numbers, do recognize that it is a very limited future you are being invited to glimpse. All you can get from the big numbers are big numbers. Our sense of future, on the other hand, is made up of the little things which give life its texture.

Remember, too, that 2050 will be as different from today as 1984 was from 1948, as today is from 1984. Indeed, it will probably be more different because the pace of change is accelerating. Even if the big numbers turn out to be as accurate as those predicted, the rate of change among the little things will have made it dazzlingly unfamiliar.

One

LIVING A TEENAGE DREAM

When the Adam Smith Institute commissioned Mori to conduct a poll of the ‘millennial generation,’ those who approached adulthood at the turn of the millennium, it found that 43 percent of them listed “being a millionaire by 35” among their top career goals. The highest single career aspiration was to own and run their own business, with 48 percent, slightly more girls than boys, putting this among their goals. The implication was that people in this age cohort, and perhaps others, are prepared to take chances in pursuit of success.

A generation earlier they might well have listed safe and comfortable jobs in such things as public service and the professions, jobs that they might have held for life, but now their answers reflected on the uncertainty and instability of a fast-changing world. It is true that the proportion employed in manufacturing has declined under the impact of imports from now-global markets and the application of new technologies, but it is also true that new types of jobs have more than replaced the lost ones.

This will be even more evident by 2050 as radical new technologies make their impact. 3D printing will have a huge impact, bringing

automation to small and customized products just as previous technology brought it to mass-produced ones. Good as diverse as medical instruments and fashion items will be routinely produced in this way. On a larger scale it will be possible to produce aeroplane parts and even building materials that can be assembled into instant houses. On a more personal level 3D printing will be used to custom-make bone substitutes that can be inserted into human patients.

The impact of 3D printing is that it reduces the need for economies of scale. Mass-production required many items to be made in order to reduce the cost of each, but 3D printing will make it efficient to make unique, one-off items designed on a computer and printed out as single items.

The manufacturing jobs lost to this technological advance will be replaced, in some cases by jobs that do not exist today. There will be new types of service jobs, and jobs in the new technologies that are beginning to reveal themselves. The ‘jobs for life’ world is rapidly passing away; for many people it has already done so. Today’s teenagers will regard it as commonplace that they will move between several different jobs over their lifetimes.

MONEY, MONEY, MONEY

People will be richer in 2050. An average economic growth of 2 per cent per annum will result in living standards being doubled by 2050. This will represent a growth in real wealth, rather than merely an increase in incomes swallowed up by higher prices. Many of today’s teenagers will be millionaires, not perhaps before they reach the age of 35, but over their lifetimes. Again, this is not in depreciated currency but in real wealth. They will enjoy the living standards of today’s millionaires.

When Orwell wrote in 1948, his generation could see how rich people lived. They owned telephones in their houses; they had motor cars; they took holidays abroad. A generation later these luxuries became general among the population. The best guide as to how people will live in 2050 is to look at how rich people live today. Most of today's teenagers will live like today's millionaires do, enjoying the same things.

Part of the reason for today's teenagers becoming millionaires will be pension funds. The current old age pension is a pay-as-you-go system, with today's benefits for older people coming from today's contributions by younger people. When the 1942 Beveridge Report was implemented by the postwar Atlee government in the late 1940s, the average worker was male, left school at 16, worked for the same firm all his life, retired at 65 and died 2 years later. Contributions from younger working people could support pensioners for 2 years in retirement because there were many more young people. Five younger people in work could support through their taxes one retired person for two years.

As medical science advances people are living longer. Each decade sees a significant rise in life expectancy. The factors that could shorten life expectancy are the subject of massive research, and there is every reason to suppose that many will have been eliminated by 2050. The odds are high that most of today's teenagers will live to be 100 years old. Indeed, that would be a conservative estimate. This will seriously alter the ratio of young people to old people, and will affect the economics of pay-as-you-go systems.

It is quite wrong to suppose that most older people in future will depend on others to support them. Increased longevity will involve people being active and fitter until much later into their lives. Retirement as a concept will disappear, and people will look back in

astonishment that people once thought of a working life of four decades followed by several decades of doing nothing.

As people grow older in future, they might well trade down to less demanding tasks, but most will remain economically active. Even the diminishing numbers who have spent a life in heavy manual work will probably trade down into working for charities or other less demanding tasks. But they will not 'retire' as the term is understood today.

Nonetheless, the changing demographic patterns make a funded system of personal pensions more appropriate than an unfunded state pension, and at stages during the coming years we can expect the pay-as-you-go system to be augmented and ultimately replaced by personal pension funds. People will pay into personal funds, as will their employers, with the state's role being one of paying into funds on behalf of those unable to do so themselves.

The funds will be handled by fund managers and, as they are invested in emergent technologies, will grow as the economy grows – something an unfunded system does not do. Over the course of a lifetime, an extended lifetime, those funds will grow to the point where it will be the norm for them to exceed a million pounds. This will be the major factor in making many of today's teenagers into millionaires over the course of their lives.

RAGE AGAINST THE MACHINE

Advances in robotics will make a substantial difference to the economy of 2050, in that they will be performing many of the menial but essential tasks that people need. The economies of Greece and Rome allowed a leisured class to engage in cultural and athletic pursuits because they were supported by a slave economy. Slaves produced

the food and ran the households, leaving their owners free for higher activities.

In 2050 the advanced countries will enjoy a new slave economy, with machines occupying the niche that human slaves did in the ancient world. Machines will produce most of the food, the clothes, and the other essentials, and they will run the households. This will leave their human owners and users more time for the activities they prefer, which will undoubtedly include education and participation in community and public affairs. They will leave people with sufficient leisure time and resources to engage in more travel.

Some people are concerned that the machines will leave the humans with very few jobs to do, and that they will displace a whole class of unemployed people unable to find work to support themselves. Fortunately this is a future that is very unlikely to happen. Advances in technology, including labour-saving ones, end up creating more jobs than they save. True, the textile machines displaced workers in that industry, but the wealth they created resulted in more and newer jobs.

There is a materialist fallacy which supposes that people must produce and sell goods in order to generate the wealth that can pay for services. This is not correct. Just as the baker and the cobbler can buy each other's product with the proceeds of selling their own, so the same is true of services. The person who sells lessons in philosophy in return for being taught scuba diving is engaging just as much in wealth creation as those making bread and shoes. If the machines make the bread and shoes, people will sell more services to each other. New jobs will be created, supported by the wealth of a richer society.

Two

DOWN WITH DISEASE

Despite the advent of new diseases such as AIDS and SARS, general health has been improving. Many of the conditions that previously killed large numbers of people are no longer fatal. Some, including smallpox, have been eliminated entirely. Part of the reason for increased longevity is that diseases such as tuberculosis, which ended Orwell's life, are now treatable. Heart disease is now treatable by coronary bypass operations and angioplasty. It is partly because people are living longer that cancer looms so large. Many people used to die from other causes before they reached the age at which cancer is most likely to afflict them.

Advances in medical science indicate that this will continue. Long before 2050 malaria, a disease which kills about a million people a year, half of them children, will have been conquered. The anopheles mosquito which hosts the plasmodium will be extinct, and its environmental niche will be occupied by mosquitoes that do not. AIDS will be easily treatable and no longer constitute a worldwide problem. Most cancers will be treatable by the creation and insertion of cells that will attack the tumours without damaging healthy cells. The various conditions that produce dementia will be overcome using

cells designed to target and reverse the build-up of the plaques and other conditions that induce it.

By 2050 most inherited diseases will have been eliminated by gene therapy, some of it in the womb. Genetic selection will make it possible to identify and eliminate potentially damaging conditions at the embryo stage. No children will be born disabled or with life-threatening inherited diseases.

There has been much concern over recent illnesses which have the potential to spread rapidly and become pandemics. The Ebola epidemic in parts of Africa is one; the Zika virus in Latin America is another. The severe acute respiratory syndrome (SARS) originating in China sent alarm bells ringing. The H5N1 bird flu virus did not infect large numbers of humans, but caused concern because it had the potential to do so. The Middle East respiratory syndrome (MERS), sometimes known as camel flu, also showed the capacity to infect some, but not many, humans.

New threats such as these seem to emerge every few years, and may always have one so. To some extent the concern is that the speed and magnitude of modern travel make it possible for these new threats to spread rapidly in different parts of the world. What is notable is the speed with which these new dangers are brought under control. Quarantine measures plus the rapid development of new treatments have made them far less damaging than they could have been.

Advances in medical science are accelerating, which increases our ability to deal with potentially damaging diseases that mutate rapidly. By 2050 our ability to detect these mutations in the early stages and to develop immediate counter-measures will have increased immeasurably. The range of treatments we can deploy against them will have similarly increased. We will not have eliminated mutations that allow

animal diseases to spread to the human population, but we will have increased the range and speed of our response to them.

THE STORY OF MY LIFE

Pessimists might point today to lifestyle choices that degrade health. They highlight tobacco smoking, obesity, lack of exercise, high consumption of alcohol and refined foodstuffs, all of which can play a part in making people less healthy and more prone to damaging conditions such as cancer and diabetes. People might ask whether any or all of these lifestyle factors will still be present in 250.

There are grounds for optimism on some of these. Smoking is on a declining path in developing countries. The costs added by high taxes might have played a part in this, but information has played a very large role. Now that people know the health risks associated with cigarette smoking, large numbers have chosen not to accept those risks. This drop has been accompanied by an increase in the numbers who successfully quit, due in large part to the aids now available by way of nicotine patches and pills, and spectacularly by the rise of vaping e-cigarettes which contain none of the smoke that causes most of the health damage.

It is reasonably likely that by 2050 cigarette smoking will have virtually died out in the UK and most of the developed world, and will be on its way out in the less developed parts of the world. It will be looked upon as a quaint but damaging habit our predecessors engaged in, much as we now look back on some of the more unhealthy habits our ancestors engaged in.

Obesity will be very much less of a problem by 2050 with three factors playing a large role in its decline. One will be the spread of

information about its causes and damaging effects on health. Another will be the development and popularity of foods that are as satisfying to the taste-buds but are less likely to lead to obesity. The third will be medical advances that develop drugs capable of countering it.

The lack of exercise is more problematic. The widespread switch to driverless cars and electrically assisted modes of cycling and pavement traffic will exacerbate the decline of exercise unless people become sufficiently health conscious to deliberately incorporate unnecessary exercise into their daily routines. This is likely to happen to people at the high end of education and affluence, but more difficult to predict for the population at large. It is highly likely, given the undoubted demand, that drugs will be produced that increase the metabolic gains by magnifying the effects of exercise, so that even a small amount of exercise will yield more beneficial results than it would unaided.

The same can safely be predicted for the over-consumption of alcohol and certain foodstuffs. Drugs that can reduce any harmful consequences will be developed, as will drugs that make people less inclined to over-consume in the first place. As with tobacco, there might well be the alcohol equivalent of vaping, with some product that gives the pleasurable feeling without the attendant health risks.

There is a general trend in all of this. It is that if there is sufficient demand for something, and if people are prepared to allocate the resources toward its development, then it stands a very high chance of being produced. The rewards of satisfying a widespread demand constitute a strong incentive to the research and development of such products. The odds are high that by 2050 many products will be available to mitigate the effects of somewhat self-indulgent lifestyles.

BRAND NEW MAN

One of the biggest advances will be in the development of human organs grown outside the body. Already we have seen a human ear grown in a laboratory and subsequently grafted onto the head of a young patient. Skin grafts from laboratory grown skin have been performed. This biotechnology will develop to the point that by 2050 a considerable variety of human organs will be grown externally and transplanted without the rejection problems sometimes encountered with transplants from other humans.

By 2050 it will be routine to grow organs such as liver, kidneys, pancreas and others for transplantation into human recipients. Lives which would have been ended by organ failure will be prolonged by the use of externally-grown replacements. Stem cell advances will be such that many varieties of human tissue will be capable of being generated outside the body to augment or replace the natural ones when this is needed.

Blindness will be treated both by laboratory grown tissues including retinas and corneas, but also by the use of bionic eyes which do electronically in some patients what human tissue can no longer do. Spectacles and even contact lenses will be outmoded by developments in eye surgery that can treat most vision impairment by non-invasive same-day treatments. Deafness will have been overcome in most cases by implants, grown from human tissue or made from electronic substitutes, and sign language will have disappeared completely.

The most economically successful of these new treatments will be hair growth. Already human hair has been grown in experimental laboratories. The demand for an effective treatment for male pattern baldness is such that by 2050 it will be a multi-billion pound

industry, with hair grown externally from the subject's own tissue, then inserted in a medical procedure, one single follicle at a time, into bald or thinning areas. This will initially be an expensive luxury, but will rapidly come down in price and be a commonplace treatment. By 2050 in developed countries at first, and then others, there will be no involuntary male baldness. This one development alone will constitute a major improvement in the well-being of a large section of the population.

Not only hair, but other aspects of physical appearance will be the subject of major advances. The UK population of 2050 will be better looking than their predecessors, and this will be generally true. Advances in medical technology will make cosmetic procedures more widely available, and the increasing wealth of society will make them more affordable to the general population.

Cosmetic surgery, hitherto in the domain of celebrities, will be widely used to improve physical appearance. Advances in dentistry will make unsightly teeth a thing of the past. The ability to help people regenerate their teeth will be developed. People will choose to alter the shape of their nose, their jaw-line or other features, without the somewhat traumatic and expensive surgery it takes today. It will be routine for teenagers to undergo treatment to improve their appearance.

Some critics will claim this might lead to a narcissistic generation, overly obsessed with the perfection of personal appearance, but the reality will only be one of improvement, with people using technological advances to make the circumstances of their lives better than they would otherwise have been, and to improve their self-confidence by removing unnecessary causes of unhappiness.

The actual provision of healthcare in the UK will be unrecognizable in 2050. There will be no state hospitals or state-employed nurses or doctors. Treatment will be provided by a range of independent hospitals, some of them run for profit, but many on a non-profit basis. There will be little attempt to standardize healthcare across the nation, and the emphasis instead will be on community healthcare, with communities learning best practice from others. There will no longer be anything that corresponds to a 'national' health service, and this will reflect changes that have taken place elsewhere in the economy.

In the days of mass production, standardization was the key, with identical products available as output. As technology and automation progressed, it became increasingly possible to tailor make products such as cars to suit varied individual choices, such that even today by the time the customer's preferences for trim, colour, style and accessories have been incorporated, no two cars coming off the production line are identical.

This process will be extended to the mass state services. The former model, in which people paid through taxation and then received a mass service which provided everyone with a similar product, will change into one in which people give effect to their preferences, such that individuals will no longer receive identical services. Instead the service they receive will be tailor made to their own preferences and needs.

Healthcare in 2050 will be partly state funded, but increasingly by private insurance, some of it employer provided. The state's role will be to help fund individuals, not institutions and personnel. Treatment will be guaranteed for everyone, no matter how poor, no matter how sick.

This will make a huge difference in attitude. A state-run health service tends to tell people how to live, what to eat, how much to drink, and to use the power of law to impose its will through taxation and prohibition. A health service provided by private institutions and personnel, even if its patients are state funded, will be more concerned to treat people who need help, even if their free choices have been a contributory factor. Medical personnel will advise on what is sensible, but they will no longer have the power to control people's lifestyle choices. They will treat them instead as customers, customers who have the power to take their funds to other doctors and other hospitals.

The state will still have a huge role to play in public health, in taking action to prevent outbreaks and epidemics, in commissioning research into potentially damaging environmental factors. Just as the state took the initiative in removing lead from petrol, and is even now seeking to reduce the damaging particulates that come from diesel emissions, so it will in 2050 play a leading role in investigation and taking action on new threats that might be posed to public health by some of the innovations of the day.

Three

BE TRUE TO YOUR SCHOOL

Education in Britain will look totally different in 2050. As with other services, there will be a move away from the state as provider and towards the state as enabler. Children will still be entitled to a free education, but it will be a better education, and the state will not own the schools or employ the teachers.

Building on reforms already under way, most schools will be free-standing and self-owned, controlled neither by central government or local authority, but self-governing. Some schools will be for-profit schools, many of them in chains of similar schools run by the same companies. Most of them will not charge fees to students, but will depend financially on the allocation per child provided annually by the Department of Education. Schools will receive government funding, therefore, based on the numbers of children they can enroll.

What takes place in classrooms will be fundamentally and visibly different from what happens now. Much education will be done by computers with artificial intelligence. Each child will have a personal tutor, a computer program that will educate the child at a pace suited to it. The system whereby teachers try to take a class forward at the

same pace will be replaced by one in which each child learns at a pace it can handle, and the teacher's role will be to co-ordinate, to encourage and lead the class to interact with each other on the basis of what they have learned. Brighter children will not be held back as their slower classmates catch up, nor will slower children be dispirited by feeling they are failing to keep pace. As with manufactured products, each individual will have one customized to their own needs.

Education in 2050 may well not involve a physical computer sitting on a desk. The child might access it by a virtual screen that appears before their eyes, and communicate entirely by voice. Furthermore, this will not be confined to the classroom. At any stage outside, the child will be able to summon the computer's attention vocally and engage in a conversation with it. The computer's answering voice will not require a visible speaker; it will simply appear as an answering voice as if it were in from of them.

Most of the subjects will be familiar. They will include mathematics, English language and literature, other languages and their literature, history, geography, the sciences, and so on, but there will be other subjects added.

The performance of schools and their pupils will be monitored, and it will be on the basis of results, or in other words on the educational attainment achieved. Schools which achieve the best results will attract the most applications. Some schools will choose to specialize, trying to gain a reputation for excellence in particular subjects such as mathematics or music.

Schools that under-perform will find their rolls dwindling, and will either have to adopt a new approach, or close down and be replaced by a more successful school. Education will be better, and standards higher. People in 2050 will look back in disbelief that their

predecessors could take children for 7 hours a day, for 40 weeks a year, for at least 11 years of their lives and turn out large numbers who were functionally illiterate. No child in 2050 will leave school without a secure grasp of the basic essentials of education, a grasp sufficient to make them employable in an age which will place a premium on skills.

COLLEGE LIFE

The big change in university education is that by 2050 it will have become much more globalized. It will be routine for UK students to include foreign universities in their list of choices, and large numbers of them will go overseas to study. While the emphasis will be on English speaking countries, it will include several countries which today offer English language university courses such as in the Netherlands and Spain. By 2050 their numbers will have swollen by other countries that will offer university courses taught in English.

In turn UK universities will see many more foreign students studying there. Already some UK universities have a relatively large foreign intake; by 2050 it will be significantly larger, and many universities will offer supplementary English language courses to bring all foreign students up to the standard required for UK study. The UK government will facilitate this trend by reaching bilateral deals with other countries to relax the visa rules governing foreign students.

There will be several more private universities in the UK. Some of these will have been started from the beginning, some will have converted other institutions into private universities, and a significant number of them will be existing UK universities which between the present day and 2050 will have opted to go private.

A significant factor in this trend will be the decision of a future British government to allocate research grants to private as well as state universities. For a number this will tip the balance in favour of going private and being no longer subject to Department of Education directives concerning their admissions or teaching policy.

University education in the UK will be much less uniform than it is today. With many different types of institution, there will be a variety of different approaches to choose between. Some will compress course to two years by eliminating much of the vacations, especially the long summer vacation. Others will offer 4-year degrees that lead straight to a master's degree. A few already do this, but by 2050 there will be many more doing so because there will be a significantly increased demand from students to undertake courses which lead to the award of a postgraduate degree.

There will similarly be a variety among the types of instruction on offer. While the prevailing model will probably still be one of a lecturer facing a class, with periodic essays and exams required, there will be alternatives, especially among those using the latest developments in information technology.

POWER TO THE PEOPLE

Fossil fuels will still be in use by 2050, but in smaller quantities and for different purposes. The main fossil fuel in developed countries will be gas. Many more reserves will have been discovered that can be extracted by hydraulic fracturing (fracking), giving world reserves of several centuries based on estimated needs.

Gas causes some pollution, but much less than coal. Every coal-fired power station that is replaced by a gas-fired power station cuts

emissions by over 50 percent. Coal, or at least dirty coal, is cheaper than gas, but decades before 2050 gas will be sufficiently cheap to make the substitution worthwhile.

Fossil fuel in the form of oil will be used in poorer countries to replace indoor cooking and heating. The Copenhagen Consensus makes the point that:

“Air pollution is the world’s deadliest environmental problem. It kills 7 million people each year, or one in eight deaths globally. 4.3 million of these deaths are due to 2.8 billion people in the developing world who cook and keep warm inside their homes, by burning dung, firewood and coal – filling their living spaces with smoke and pollutants. Indoor air pollution from cooking and heating with open fires is equivalent to smoking two packets of cigarettes a day.”

By 2050 most of those 4.3 million deaths will not be happening because people in poorer countries will have switched to more efficient fossil-fuel stoves with outside chimneys and vents. By 2050 many of these will already have converted to LPG stoves, polluting even less, and a process will be under way to convert the remaining ones.

Power stations in developed countries will depend on three principal sources. There will be gas-powered stations, nuclear stations, and solar-powered stations. In cost terms photovoltaic solar will have become cheaper than gas before the end of this decade. By 2050 it will provide a very large proportion of the world’s energy, especially that consumed in developed countries. Wind, wave and water power will make a small contribution, but have limited wide-scale application because of the limited geography in which they can operate efficiently. And on a tiny scale, Iceland will be exporting geothermal energy as transmission and storage costs decrease.

These three major fuels will be used to provide energy in the form of electricity, and will do so much more efficiently as technology refines the engineering necessary to produce it, and as transmission and storage costs drop dramatically.

Most vehicles will be powered by electricity. Cars and trucks will be electric, and most cities in the developed world will long have banned internal combustion and diesel engines. The ban itself will by 2050 be something of an anachronism because there will hardly be any such engines. A few will be kept as recreational and sports vehicles, but none will be in general use for transportation of people or goods. Fuel cell technology will play a relatively insignificant part because the infrastructure for electricity is largely in place, and because the cost of producing it will decline so dramatically. By contrast the infrastructure to use and transport liquid or compressed hydrogen hardly exists.

Electric power will be used to propel both aircraft and shipping on a regular basis, with more energetic fuels reserved for ultra high speed trans-sonic and supersonic flights and for space travel.

Energy costs will by 2050 be a fraction of their present day costs. For most consumer uses, energy will be effectively free. Cars will be sold with free recharging provided. Many houses will be equipped with photovoltaic solar panels and will have battery power packs that are supplied with subsequent free recharging. Energy will be cheap and plentiful everywhere, with significant impact on processes that have a high energy input.

DRIVE MY CAR

The two revolutions currently making themselves felt in the automotive sector will have a profound impact that will still be reverberating in 2050. Just as mass auto production revolutionized personal transport in the first three decades of the 20th Century, so will electrification and autonomy change the way people live, work and travel.

All-electric cars are already competitive with those powered by internal combustion engines in terms of performance, and are rapidly approaching them in range. Some of them are already far ahead in safety, having the electric motor underneath and crumple zones front and back, and carrying no inflammable liquids.

Electric cars will be the norm by 2050, with petrol and diesel cars banned from cities. The same will be true of trucks, with electric motors replacing internal combustion engines. Battery technology will make huge further strides, improving both capacity and output.

Autonomous, or self-driving, cars will be the norm by 2050. They will be in automatic communication with other vehicles so that they can co-ordinate their driving. The owner will simply tell the car where to go, and the vehicle itself will calculate the best route to the destination and take its passengers there. The electricity to charge the batteries will probably be free, so there will be no cost beyond that of the vehicle itself.

Without the need for a driver, the whole internal layout of the car will change. There will be no need for two rows of seats facing forwards. Instead some owners will choose to have the seats facing each other, and be more like conventional armchairs than car seats. Others will choose to lay out the interior of their vehicle as an office, complete with a desk or table. Some will choose to have a bed that unfolds.

All vehicles will have communication links enabling the occupants to engage in work or entertainment as they are driven to their destinations. Some commuters will be ready to travel greater distances to work, given that they can now spend their travel time in a vehicle fitted out as a remote extension of their office or their home, or both. It will be more comfortable and considerably less stressful than commuting to work by car, train or bus today.

The ability to be driven home safely might well make people readier to stay in city centres for entertainment after work, knowing that their vehicle will take them home afterwards. This could lead to changes in the timing of shows and restaurant meals. It could also make city centre housing less attractive and therefore less expensive.

TRAINS AND BOATS AND PLANES

Electrification and autonomy will radically change other modes of transport in addition to the changes they make to automobile transport. Self-driving electric buses will be commonplace in 2050, and driverless trains and underground metro systems will replace ones manned by human drivers.

The technological revolution will extend to conventional aircraft, with automated planes powered by high energy batteries providing much of passenger transport. Transsonic and hypersonic planes will use fossil fuels mixed with atmospheric oxygen to power scramjets. Most of these will be for ultra high-speed business jets, but there will be supersonic passenger planes as well for passengers prepared to pay extra for the convenience of short flight times.

Cargo ships will be electric powered and automated, though they will still be manned by small crews. Computers will control their courses

to avoid rough seas and other ships. Passenger and cruise liners will similarly be largely powered by electricity, and will be less vulnerable to the weather than are modern day liners because technology will have advanced to the point where stabilizing counter measures can be incorporated to smooth out the effects of rough seas.

For personal travel within cities people will be able to summon driverless cabs to take them to their destination, ones that will respond to voice commands in several languages. There will be efficient and lightweight folding electric bicycles for those who prefer them, and for pavement traffic there will be low level Segway-type platforms that require no skill to ride, available for those who want something somewhat faster than walking.

It is unlikely that aerial personal transport will be in widespread use, and certainly not in cities or their approaches, although there will be lightweight people-carrying drones which, too, will be electrically powered, available for recreational use. Young people will undoubtedly use them for some new games which will have made their appearance by 2050, perhaps shooting lasers at each other in an airborne version of Laserquest.

Drones in all shapes and sizes will be commonplace and will be used for a variety of purposes. Delivery will be a significant use, particularly of delivery which is needed rapidly or in difficult circumstances. In the event of natural calamities such as earthquakes or floods, large drones will be routinely used to send in urgent supplies of drugs, medicines, and fresh water as well as tents, blankets and food.

Drones will be used to deliver mail to remote settlements and to maintain communication with island settlements. It will also be standard for ships to be equipped with drones, enabling

over-the-horizon visibility, and enabling urgent supplies to be carried to ship at sea without the need to put into port.

Space travel will be available for those with enough money to buy a ticket. Sub-orbital flights will routinely enable passengers to experience weightlessness and to see the Earth from on high. Orbital flights will also be available at greater cost, with some passengers paying to spend a few days in Earth orbit aboard a somewhat cramped vehicle. Some of the rockets capable of carrying such passengers will be among the very few modes of transport in 2050 that still use fossil fuels.

Four

GREEN, GREEN, GREEN

Agriculture will be very much more environmentally friendly by 2050; this will be true throughout the world, but especially so in the UK. The difference will have been achieved by the widespread, almost universal, use of genetically modified organisms (GMOs).

GMOs will be used to develop strains of crops which can fertilize themselves by the fixation of atmospheric nitrogen to make nitrates. Genetic engineering will alter cereal crops so they can achieve what legumes currently do. This will remove the necessity to spread fields with large quantities of chemical fertilizers, with the attendant runoff into rivers and streams that creates algae blooms that kill fish by using their oxygen.

Strains of plants will be developed that contain their own pest-resistance, incorporating into food crops genes from plants that already do this. This will make it unnecessary to apply large quantities of chemical pesticides with the polluting and toxic effects that some of them can have.

The combination of self-fertilization and pest resistance will significantly increase the yield per acre of many food crops, but on top of this new strains will be developed through genetic engineering that have higher edible yields per plant; each modified plant will produce more food than did previous strains. The effect will be to increase the yield per acre even more.

By 2050 genetic modification will have produced crop strains that can thrive in previously unproductive land. There will be crops that are saline tolerant, drought resistant, altitude capable, heat tolerant and cold tolerant, and ones that can grow on land previous thought insufficiently fertile. The effect will be to make much more land susceptible to cultivation, land that was previously thought of as wasteland.

These developments will remove the pressure to cut down rainforest in order to use the land for cultivation. And genetic modification will be used to create very fast-growing trees, ones that can mature in 6 years instead of 50, and which will take in carbon from the atmosphere, as well as extending the world's tree cover. This will make a significant contribution to carbon capture by 2050. Genetically modified plants tailor made to thrive in desert conditions will be making a significant reduction in the world's desert cover by 2050.

The UK will be a pioneer in all of these developments, and many of the scientific breakthroughs will be achieved in UK laboratories and universities. Britain's tree cover will be greatly increased over the years leading up to 2050, and the country will be renowned as the "Green Island," green for its environmentally friendly policies and practices, and green for its greatly increased tree cover.

A CLEAN BREAK

Contrary to a popular but untrue myth, Britain in 2016 is much cleaner than it has been in the past. Filth and disease were commonplace in the cities of Britain's past, so commonplace that they were accepted as inevitable. In the London of 1900 there were 11,000 horse-drawn hansom cabs and several thousand horse-drawn buses, each pulled by 12 horses. There were horse-drawn carts, too, making over 50,000 horses engaged in daily transport, each producing between 15 and 35 pounds of manure each day. The manure attracted flies and the flies spread typhoid. Urchins would stand with brooms at street corners, and for a small coin would sweep the road so that gentlemen and ladies could cross without soiling their clothes or footwear. The motor vehicle solved the problem of manure.

In post World War II London every home was heated by a coal fire. The smoke from those fires mingled with fog to make smog. In the great smog of 1952 which lasted for 2 weeks, theatre performances were cancelled because the audiences could not see the stage. 12,000 Londoners died of respiratory ailments in 2 weeks. The Clean Air Act of 1956 addressed the problem by banning the coal fires.

By 2050 the UK's air and water will be much cleaner. Electric transport will eliminate the petrol fumes and diesel particulates that pollute today's city air, and industrial production will be cleaner, partly by the switch away from oil and coal-generated energy.

Britain's rivers will be cleaner, too. Already they are much improved on a somewhat polluted past, and by 2050 this will have been taken much further. Part of this improvement will be brought about by policies and laws, but much of it will be down to cleaner production. Factories will emit less pollution into both the air and the water. Again, cleaner and cheaper energy will be part of the solution. Clean

production is more costly than polluting production, but by 2050 the UK will be at least twice as rich, and the extra energy expended in cleaning up emissions will be much less costly than it is today.

There will be no coal-fired power stations, and the few remaining oil-powered ones will produce far fewer atmospheric pollutants than they do today. Technology will make it possible to produce things more cleanly, cheap energy will make it viable, and wealth will make it affordable.

THIS IS YOUR LIFE

There will be significant lifestyle changes by the middle of this century, many brought about by technological advances which enable people to live as they want to rather than be constrained by biology or social pressures. Government will be largely indifferent to the domestic arrangements people make, and will gradually cease to use financial incentives to promote particular lifestyle choices.

In 2050 marriage will still be popular, both opposite sex and same sex, as will couples living together without undertaking marriage. The typical pattern of today in which a couple in late 20s or 30s marry and have children a few years later will change. Women, already choosing to have children later, will have even more choices in future. The realization that the so-called gender gap in earnings is in fact a maternity gap will impact upon lifestyle choices, especially for women.

Women in the UK currently out-earn men until age 38 on average, then choose to become mothers and earn less than men who stay in work full time. Advances in reproductive technology are making it possible to delay having children even later, and many couples will choose to do this. Motherhood for increasing numbers will come after

a successful career, and men, too, will tend to father children later in life as they stay fitter longer, and have the chance to achieve financial security before starting to raise a family.

One result will be an increased average age gap between children and parents. A 50 year age gap will not be remarkable as people choose to seek stability and achievement before embarking on a family. Since 2050's 50 year-olds will be at least as fit as today's 30-odd year-olds, this will pose few problems. Indeed, it might result in the disappearance of the "generation gap." Given a 50-year age difference, parents and children will in no sense be competing. Households will be more financially secure, and parents less stressed by financial worries.

Today's tendency for adults to remain younger for longer in their dress and tastes will be even more pronounced. People will see no reason to conform to expectations, since they will be physically young enough to enjoy youthful activities and tastes. The idea that people have to 'mature' as they grow older, becoming more staid and less enthusiastic about things, will seem long outdated. Technology and medical advances will enable people to live as they want to live, rather than conforming to some concept of how they 'ought' to live.

TAKIN' CARE OF BUSINESS

Large numbers of people in Britain will be self-employed by 2050. The numbers in self-employment will grow steadily over the decades, and could constitute a majority by the middle of the century. The trend is part of the move away from lifetime employment by a single employer. Many people already shift jobs during the course of their lives, and the trend will continue. People will choose to be self-employed, having a succession of contracts with different employers.

The UK Treasury has resisted the trend, preferring to have people classified as fully employed so they can collect tax directly from the employer, but they will be unable to resist the changes overtaking the job market, and will eventually succumb to the needs of the workforce. When the Treasury loses the ability to prevent people registering as self-employed, the trend will accelerate rapidly.

People will opt for the flexibility that allows them to choose the time and extent of their holidays, or whether to take time off in the early stages of parenthood. Employers will seek to secure their loyalty by the rewards and conditions they offer in contracts. Trade unions will become organizations more akin to the friendly societies they originally replaced. Instead of a confrontational approach representing employees against their employers, they will become service organizations helping to negotiate contracts, providing legal advice and services, offering pension advice and generally making life easier for a largely self-employed workforce.

Pensions will have changed dramatically by 2050. Since people will work under contract for successive employers, there will be no employer-owned pension funds. The pension funds will be individual, the property of the worker, and successive employers will pay into them, alongside contributions saved by the workers themselves.

There will be no defined benefit pensions schemes based on final salary, and each individual's fund will depend on the amount paid in by that person and their successive employers over the years. People will have complete freedom to decide how to use their pension funds once they have reached a certain age, one which will keep advancing as people live longer, healthier lives.

Government is likely over the course of a generation to move away from a system of giving tax advantages to encourage pension saving,

and gradually to move instead to a system in which pension saving by individuals is made out of taxed income, but in which all growth generated within the fund will not be taxed, and neither will be funds as they are eventually withdrawn. Pension contributions by employers will be a normal business expense up to set limits. Funds remaining in these pension funds at the time of death will form part of the estate to be bequeathed to beneficiaries of the will.

The state pension will not continue in its present form. It will be anachronistic in an age where people no longer expect to spend decades of doing nothing after a working life. With the disappearance of the notion of retirement will come the demise of the state pension. The individual pension funds will support people who no longer earn enough to support themselves, and one of the state's roles will be to pay into such funds on behalf of those unable to do so for themselves. But the universal benefit paid to all elderly people will disappear. There will still be state support for those who need it, but these will be a small and diminishing proportion of the population. Dependency for most elderly people will be replaced by self-dependency.

Five

COOL WATER

Although some have predicted water shortages and even “water wars” by the middle of the century, the reality will be one of plentiful supplies of clean water suitable for agriculture and for drinking, and in places where it is needed.

An immediate help being done already is the digging of additional wells in poor countries, funded by aid from richer countries, some of it governmental, and much of it charitable. This reduces the need for poor people to walk miles to bring home fresh water. There are also small-scale efforts to boost water purification so it is no longer a source of diseases.

But the main reason why water shortages will have been redressed by mid-century will be the spread of large-scale desalination. Water itself is plentiful; it covers four fifths of the Earth’s surface. The problem is that it is of the wrong quality and in many cases it is in the wrong place. Desalination is costly because it is energy intensive. Desalination by osmosis, using membranes to separate out the unwanted impurities, is very effective, but uses a great deal of energy.

By 2050 there will be cheap gas and photovoltaic power to supplement nuclear, and energy will be very cheap indeed. This will dramatically reduce the costs of osmotic desalination. By 2050 huge quantities of seawater will be being purified daily by massive desalination plants in coastal areas. Some of them will be powered by solar power plants, some by liquid petroleum gas extracted by fracking. Some might even have their own small-scale nuclear power plants next to them. The spread of this desalination technology will bring a massive increase in the available supply of clean, usable water.

The water will be piped down huge pipelines to where it is needed. In 2016 we pump large quantities of oil down thousands of miles of pipes. In 2050 we will be doing the same with water. It costs energy and therefore money to do that today, but by 2050 the price of energy will be low enough to make this viable. This will make irrigation and therefore cultivation possible in areas unsuitable for agriculture today. It will bring clean, usable water to settlements that have to carry in supplies of it today.

The availability of large quantities of clean, usable water brings with it the possibility of urban farming by hydroponics. By 2050 several cities might see a new form of 'factory farming' in which crops are grown in skyscrapers in the city, using nutrient laden water instead of soil to nourish them.

FOOD, GLORIOUS FOOD

Someone in 1948 might have outlandishly predicted that people in 1984 would sit down to a meal with a vegetable that did not then exist, meat of a type that they had never heard of, and cooked in a way that did not then exist. Had they done so, they would have been proved right on all three. Had someone predicted in 1984 that the people of

2016 would do the same, they would have been right again. It is by no means outlandish to predict in 2016 that the same will be true for people in 2050.

Over the years we are changing and developing what we eat. New vegetables are developed by cross-breeding. As tastes change, meats come in and out of fashion, and one generation eats what their predecessors did not. We explore and develop new ways of cooking, from microwave to sous-vide.

There will undoubtedly be new vegetables by 2050. Not only will new ones be created by cross-breeding, genetic modification will play its part, too. Varieties will be developed that are more nourishing and more appealing to the palate. It is likely that some will be developed with therapeutic properties, to supply those eating them with beneficial additives such as vitamins.

The new meats will include lab-grown ones made without involving animals. By 2050 there will be a variety of such meat styles available, all at very affordable prices. Just as farmed salmon took hold over the course of a generation and made salmon an affordable commodity for everyday eating, so will synthetic meats be manufactured on a factory scale, and be available and affordable to those who choose them.

Each generation seems to discover a new way of cooking, and it is an unremarkable prediction that the next one will do the same. Fashions in food preparation change as people discover new ways of preparing it. Some of these changes come about by advances in technology, some are developed to satisfy changing tastes. It is quite possible that some of the food eaten in 2050 will have been prepared by a process that directs heat into the centre of the food rather than by cooking it from the outside as most methods do today.

Pessimists since Malthus have suggested that population increases will outstrip humanity's ability to feed people. They have been wrong before, and will be again. Alarmist predictions of "population time bomb" are wide of the mark. A population of just over 7 billion in 2016 will probably level off at about 10 billion before declining slightly. The point is that as the world becomes richer, people have fewer children. They no longer need the children's contribution to the family budget, or their support in old age. Societies become wealthy enough to put children in education instead of work, and to afford social services that care for people if they become unable to look after themselves.

The pessimists such as Paul Erlich failed to predict the Green Revolution which greatly increased food productivity per acre and enabled the world to feed an expanding population. Their successors now fail to predict the next revolution to overtake food production, that of genetic modification. By 2050 it will easily have enabled us to feed the world's population.

In addition to increased crop yields, and the greater acreage that can be used for food production, there will be technological advances in using micro-organisms to produce nourishing food. Some will be developed which use atmospheric nitrogen, and others will convert inedible waste products into food. This can be done in factories rather than on farms, and will add to the range of foodstuffs available by mid-century.

ALL CREATURES GREAT AND SMALL

The coming 34 years leading up to the mid-century will see great advances in the field of biology. Some extinct animals will be

recreated, and some new life forms will be generated, especially at the microscopic level.

The woolly mammoth will reappear, its DNA inserted into the nucleus of a fertilized ovum and gestated inside an elephant. By 2050 there will be herds of woolly mammoths roaming in reservations and in the wilds of Siberia. They will be popular as tourist attractions.

Other species will be recovered from the more recent past, with the Dodo and the Great Auk likely to feature amongst those recovered. Neither is likely to be released into the wild until a sufficiently large and stable breeding population has been established. Before then, however, they are likely to prove very popular to tourists visiting their secure habitats.

More controversially, several species of dinosaur will be recreated, making their appearance on Earth for the first time in 66 million years. It will not be done a la Jurassic Park with their DNA extracted from blood-sucking insects preserved in amber. It was always highly dubious that enough of the DNA molecule would survive in this way. Instead dinosaurs will be recreated by back-breeding from flightless birds. Birds are modern-day dinosaurs, but they no longer look like dinosaurs. Deep within their DNA, however, will be information relating to the time when they did, and a combination of selective breeding and gene technology will be used to give them the characteristic features of dinosaurs – the jaws with teeth, the tail, the small forelimbs.

Biologists will succeed in using that buried information to ring the desired characteristics to the fore. Once one type is successfully developed, others can be developed from it, just as modern dogs all descend from wolves, though of course with modern technology this will be done within years, decades at most, instead of millennia.

It is doubtful that dinosaurs will be released into the wild, though some herbivores might. Instead they will be kept in reservations and studied for behaviour characteristics that will tell us more about their original antecedents.

This will be controversial because some scientists will claim that these will not be descendents of the original dinosaurs, but modern creations created to look and act like the originals. This is a valid criticism, but it is highly likely that there will not be much difference, and that they will be accepted as real dinosaurs.

Some modern animals have already been adapted to serve human needs by producing drugs needed in medicine, and this process will continue, with many more animals genetically modified for such purposes. Although this process will have its critics, as it does today, it will be widely accepted by 2050 if the animals concerned are treated decently and given satisfactory lives.

The process of creating new life forms which have not existed on Earth before will be more controversial, with charges that the scientists who develop them are “playing God.” At the microscopic level there will be many such life forms developed by mid-century, and they will serve a variety of human purposes. Some will be developed to turn inedible waste into nutritious food. Some will eat toxic waste to clean up environmentally damaged land. Some might be used in mining, sent underground to digest valuable elements and then flushed out so that the precious materials they now contain can be harvested.

Microscopic life forms will be developed that can extract carbon dioxide from the atmosphere in large quantities and capture it in solid organic form as feedstock for animals. Some of this will be done in the

oceans, some on land, with the effect of converting significant quantities of atmospheric carbon into food for fish or livestock.

New bacteria will be developed that can release into the atmosphere oxygen trapped in soil, and there will be early experiments performed on Martian soil and rock to see if the process might be viable in large scale on the planet. While experimenters set about confirming that it could be done, there will be considerable debate over whether it should be done.

HAPPY TALK

Communications technology will have improved as dramatically in the next generation as it has in the last one. The devices that enable people to communicate will have grown even smaller, in some cases small enough to plant under the skin, perhaps behind the ear. They will be less costly to buy or to operate, and will have power sources that can charge by induction simply by passing fixed power points.

By 2050 it will be possible for a person to communicate with anyone ready to listen, anywhere in the world, without cost, and without any visible instrument. People will be able to speak without a visible microphone and to hear words in their ears without the presence of loudspeakers. Long distance communication will resemble a conversation people have with someone physically present.

For those who prefer it, it will be possible to see those conversing with them, their image projected onto a virtual screen in front of those they talk to.

Communication with those who speak other languages will be very easy indeed. Before 2050 there will be electronic multi-lingual

translators. A small box a few inches high placed on the table will hear one person's English sentences and put out a translation into Japanese or Mandarin of any other preferred language. The voice which emerges will not be a flat mechanical one, but will sound like the talker would sound if they actually spoke the other language.

Such devices will be in routine use, and sufficiently accurate for business and diplomatic use as well as an everyday convenience for people wishing to converse with those unable to speak their language. They will be used every day by the media to allow their audiences to hear foreigners speak in the audience's own language.

People will speak to computers in words, instead of tapping letters on a keyboard, and for many interactions they will choose to hear the computer's reply in words directed to them.

OUR HOUSE

Most of the homes that people will inhabit in the UK of 2050 have already been built. With a few minor differences they will look very much the same on the outside as they do now. There will be more with solar panels to generate electricity, and there may be more with new types of aerials attached. Many of the houses will have charging pods for electric cars.

The big differences will be on the inside of the houses. Many will have large battery packs that provide and store electric power to operate the various appliances the house contains.

The trend to multi-function rooms will continue, including the use of the kitchen as the main living area of the house. A typical kitchen of 2050 will have space for cooking, an eating area, and space for

someone to sit and work during the day. There will quite likely be greater use of furniture that folds away neatly when not in use, reflecting the fact that different activities will take place in a room at different times. Different parts of a room will make use of subtle decorative changes that reflect its different uses without closing off the large visual space it contains.

The majority of homes will be owner-occupied. The proportion of privately-rented homes in Britain was eight out of ten in 1918. Nearly a hundred years later it was down to roughly one out of ten. By 2050 that proportion might well have increased, but owner-occupation will still be the main type of dwelling.

The current stock of about 25 million homes will have been augmented to reflect the increased population, the fact the people will be living longer, and the increasing numbers of single-person households. Some of the new homes will be in high-rise city apartments suitable for singles or childless couples, but these are not ideal for families who want to raise children, children who need places to play with their friends. There will be a need, long before 2050, for new homes with space for gardens or play areas.

Many of these new homes will be on land designated as agricultural land today, in clusters of small communities set in some of the new woods that will have been created. The advent of self-driving electric cars will make commuting less burdensome and stressful than it is today, and people might well trade a longer commute in return for living in a pleasant space.

The other unseen change will be in the way housing is financed. Variable rate mortgages will largely have given way to fixed rate mortgages, and it will not be unusual for parents to contribute to the purchase of their children's houses as a means of passing on part of their

estate while they are still alive. At some stage in the coming years government will introduce tax changes that make this an attractive tax-free option, so that by 2050 it will be quite a normal arrangement.

Conclusion

IN THE END

Although in the world of 2016 we are assailed on almost a daily basis with stories of the doom and disasters that loom ahead of us, the reality which emerges will be different.

The world will not drown in a mass of people, and we do not need to take urgent action to control increases in population. The strongest likelihood is that the world's population of 7 billion will rise to 10 billion and thereafter start to decline as prosperity brings its attendant reduction in the birth rate.

There will be no shortage of energy, no "peak oil." Indeed, oil will produce a diminishing proportion of the world's future energy, its place taken by gas, nuclear and photovoltaic solar. Energy will be abundant in 2050, and will be free to many consumers as they charge up their cars and their houses.

Nor will the world drown in pollution. It will be cleaner than the world of today, with cleaner air and cleaner water. The few coal power stations that still exist will be cleaner, and even oil-powered ones will be headed for oblivion. Transport will be clean, running on

electricity, removing the gases and particulates emitted by petrol and diesel engines, both of which will be banned from our city streets.

There will be no “water wars” because clean fresh water produced by osmotic desalination powered by cheap energy will be available everywhere, piped to landlocked regions.

The world will produce abundant food through the use of crops that require no fertilizers or pesticides, and can thrive in areas where crops cannot grow today. Genetically modified organisms will not threaten humanity; instead they will be its salvation.

Humanity will not be wiped out by new and deadly diseases. On the contrary, ancient enemies such as malaria will be extinct, and our ability to respond with counter measures to newly mutated outbreaks will be quicker and more effective.

The world will be richer in 2050, and able to afford measures which make life and the Earth itself better than they were. There will be no insuperable problems caused by ageing populations in richer countries. Pensions will be fully funded, their funds invested in improving productivity, and more than adequate to pay for a higher standard of living for older people.

Lifestyle choices such as smoking, obesity and lack of exercise, will pose nothing like the problems evident now. Products will be available to mitigate their effects and the damaging consequences to health.

Biodiversity will increase, not diminish, as extinct species are restored and new life forms are created to serve human needs and make the world a better place.

In short, the prophets of doom will be proved no less wrong in the future than they were in the past. The world will be a better place and people will live better lives, and the reason is that there is not and never will be a shortage of human creativity and ingenuity.

Many of those who cry doom and disaster are prominent among the numbers who oppose the means by which that fate will be prevented. They oppose fracking “because gas is a fossil fuel,” they have a visceral opposition to nuclear power. They campaign to prevent genetically modified organisms being developed and used. They seem to oppose all of the technological means by which humanity will solve its problems.

The solutions will be technological, rather than brought about by making people live more limited lifestyles or closing off the choices available to them. People will not live more simply; they will live more cleverly, and the world of 2050 will be a better place.