

A Modern Society

Tackling the Climate Crisis and building a better, fairer society.

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Overview

If you were to analyse the news cycle over the last ten years and tried to find a common thread, it would be an accelerating multi-faceted environmental catastrophe. Climate Change (aka Global Warming, the Climate Crisis and the Climate Emergency) is the single biggest element in this Global Crisis; simply put, we are altering the climate of the planet and thus degrading its ability to support us. But there are several other crises that are almost as serious and they all share a common theme - that the Earth is a finite size and we are using it up. This Global Crisis is absolutely a man-made catastrophe; mankind's very success is destroying Earth. You can read about how this may play out for various people [here](#).

Given that the Global Crisis is man-made and we know it is coming, you'd expect that we'd just avoid it. But it seems we are unable to avoid it; it's simply our fate. We're looking at a slow motion car crash, bracing ourselves for impact as the drivers converge, ignoring or denying the risks they are running. It's not just that things are going to end up badly, but that the system is set up to ensure that bad outcome.

We can't just blame this problem on other people. Whether we are a politician trying to get elected, a tourist flying to his destination, an oil company selling its product, a motorist getting to work or a new beef farmer clearing some forest, we are all drivers in this process. We are all making choices that are logical for us, but often detrimental to the planet as a whole. Today's society has evolved assuming that it was living on an unchanging planet, that each generation could do what it wanted without worrying about future generations. But that is no longer acceptable; it's clear today's generation is consuming the next generation's planet.

What we need to do is to develop a Modern Society, where we protect the planet and following generations in the decisions we make today. To build public support, our new society has to be radically more attractive to the vast majority of people than today's society. Modern Society has to reduce inequality, to prioritize people over corporations and quality of life over economic output.

This document describes [climate change](#) and the [Global Crisis](#) and how this could all [play out for various people if we do nothing](#). It develops the ideas for a [Modern Society](#) with [an action plan](#) and illustrates how this Modern Society [changes people's lives](#).

Climate Change

When I was young, the evening news program was followed by the weather. For much of this summer, the weather was the first thing on the French news; record temperatures being broken all over Europe, devastating hail-storms and even tornadoes, June 2019 being the hottest June on record, July 2019 being the hottest ever month. There were articles about the human costs for farmers who generally can't afford insurance against the weather; vineyards where all the plants have been scorched brown and killed by the sun, orchards where all the fruit trees have been lost to hail and replanting is the only cure, cattle in completely brown dead fields being fed hay intended for this winter, high suicide rates for farmers, bankruptcies. Then there were articles on downstream problems like fires and ice melt in Greenland. Obviously this isn't scientific proof of climate change, but these are just the latest, slightly more intense, versions of messages we've been seeing for a long time.

I don't intend this document to be a scientific proof of climate change or the severity of the Climate Crisis. Pretty much everyone has formed their opinion on the topic and are unlikely to be persuaded by anything I write (George Monbiot has an [excellent article in the Guardian](#) that is far more likely to persuade doubters). There's plenty of evidence that public opinion, even in the US, firmly believes that climate change is real, serious, man-made and needs to be addressed; what's more, this view seems to be hardening (e.g. see [Vox](#)).

So I don't intend to provide any more evidence of climate change, but I will talk about some of the results and causes.

Climate Change Consequences

Until sometime around the mid-90s, climate change was called 'global warming'. Global warming makes it sound as though nothing much changes, except things get a little warmer; if you live in a northern climate, it almost sounds nice. But the results are much more dramatic and unpredictable than that; for example, warmer air can hold more water, so all sorts of weather events (e.g. hurricanes) can be more devastating. In France they sometimes use the name 'dérèglement climatique' which conveys nicely the idea that many accepted rules of climate and weather are going awry, that we are moving into unknown territory.

The exact consequences of climate change will depend on the actions we take now and in the future. Scientists have developed 4 scenarios on a spectrum of action possibilities that they label RCP 2.6 (relatively optimistic), RCP 4.5, RCP 6.0 and RCP 8.5 (the most pessimistic, described as 'the nightmare scenario'). These scenarios were developed in 2000 and refined in 2014, so it's too early to reliably say which one is the most realistic, but various sources, including [the Atlantic](#), state that we are most closely tracking RCP 8.5. It's worth emphasizing this; **we are most closely tracking the nightmare scenario.**

One clear pattern in recent years is that countries have talked a better game than they are playing. The 2015 Paris Climate Agreement showed that countries were willing to make vague promises, but when you look for concrete plans - even for the medium term - things are disappointing. For example, the EU has been unable to set a common objective for [carbon neutrality in 2050](#), China intends to build [many new coal power plants](#), Germany is only proposing to [stop generating electricity with coal in 2038](#) and [China continues to use banned gases](#). Adding to this the US's withdrawal from the Paris agreement and Brazil's deforestation policy, there are reasons to be skeptical when it comes to future actions.

Perhaps we get a better view of what's coming when we look at some of the accelerators for climate change; in particular the scale of the [ice melt](#) and [permafrost thaw](#) observed today are 50 and 70 years ahead of predictions.

For all those reasons, I think that the most pessimistic predictions - those based on RCP 8.5 - are the most likely. Of course, there's plenty of opportunity for us to improve this (after all, I'm writing this document in the hope we do so) but, right just now, I don't see any good reasons to be optimistic.

Here are some of the consequences for climate change.

Rising Sea Levels

Sea levels are rising for two reasons. First, the water in the oceans is getting warmer and thus expanding. Second, the ice cap is melting and putting more water in the seas. By 2100 it is likely that sea level will be around a meter higher (estimates vary a lot, [Wikipedia](#) gives a range of 0.3 to 2.4 meters).

30% of the world's population lives in low lying areas near the sea and they would all be directly affected (they would not all be flooded but their day to day activities would change) by this rise - we're talking about a lot of economic cost. Island nations - e.g. the Maldives - would lose their fresh water supply and be uninhabitable. 30% of Bangladesh would be flooded and 30 million people displaced. Low lying cities like Miami, Osaka, the Hague, Rio de Janeiro and Alexandria would all be directly threatened by such a rise. The UK's [National Oceanographic Centre report](#) suggests sea level rise alone could cost the world \$14 trillion dollars per year in 2100.

Ocean Acidification

Not all of the carbon dioxide we are releasing into the atmosphere stays there; around 25% of it dissolves in the oceans. This CO₂ absorption reduces the warming effect we are having on the planet but has the side-effect of making the oceans more acidic. We don't know exactly how this will affect the marine ecosystem. We do know it dissolves shells as marine life are trying to develop them; corals, shellfish and molluscs struggle to develop properly. It also affects the development of plankton - the base of the food chain - with unpredictable and potentially disastrous results. Wikipedia provides [a lot more details](#).

Climate Damage

There is plenty of evidence that climate change increases the intensity and frequency of extreme weather phenomena like hurricanes, floods, storms and heatwaves; [here is one such report](#). Higher ocean temperatures in the tropics favor the development of more intense hurricanes; we may need to [introduce a new category 6 for hurricanes](#). The warmer atmosphere can also hold more water vapour; heavy rainfall events and floods are likely to be more extreme as a result.

All of these add up to more property damage; this is likely to affect us all through higher insurance premiums in the near future. It's also likely more of us will choose to forego insurance or that insurance companies will stop offering cover for some events. Farmers are more vulnerable to weather events than most of us and seldom have comprehensive coverage; they are exposed to higher losses in the future.

Unlivable Areas

Humans have a limited ability to survive extreme heat. At a [wet bulb temperature](#) of 35C - which would be around 46C with 50% humidity - a human is being cooked and death, even for a healthy person, will follow soon. Being indoors or in the shade, having lots of water to drink, resting and using cooling fans won't change that. The only thing that will save you is air-conditioning or some other form of refrigeration.

We are on course to have this sort of temperature by 2100 occasionally during the summer in several places on Earth. One of these is the North China Plain; this contains huge cities - Beijing and Shanghai - and is vital to the country's food production and economic interests. If you don't have access to air conditioning in such areas, either you need to move elsewhere or you may die. There is more information in [The Guardian](#).

Migration

If one country is affected more severely than its neighbor by climate change, then there is pressure to migrate. Climate change is definitely a driver for migration from Africa to Europe and from [Central America to the USA](#). Climate change knows no borders, but migrants displaced by it certainly do; the USA and Europe are not keen at all to accept these migrants. There is a non-delicious irony that the very countries reluctant to host migrants generated the demand for migration when their pollution inflicted climate change on Africa and Central America.

Looking forward, countries that cover a lot of latitude (e.g. the USA, Canada, Chile and Argentina) may be able to delay the worst effects of climate change through internal migration towards the poles.

The hottest and poorest countries suffer most

If you are poor, then a relatively small economic problem (e.g. the price of flour increasing 10%) affects you much more than someone better off. An increase in average temperatures is more serious in a hot environment than a cool one. If you live in a poor country, it's less able to handle problems brought on by climate change than a rich one; for example, it's harder for a poor country to build a reservoir. If you farm for a living, you are more affected by climate change than someone working in an office. For all of those reasons and more, the consequences of climate change will be most acutely felt in the hottest, poorest countries; see reports in [Grist](#) and [Mercy Corps](#). Africa did nothing to contribute to climate change but large tracts of the continent will be devastated by it.

Drought

One reason climate change will cause drought is via reduced precipitation. Rainfall patterns will change but predicting how different regions of the globe will be affected is harder than predicting temperature rise (see [The Guardian](#)). There's a general belief that the wetter areas will get more rain (a warmer atmosphere can hold more water vapor) and that rain will often fall more intensely and cause flooding; and drier areas will get drier (see [Nasa's summary](#)).

As temperatures increase, you need more water to grow the same crops; evaporation sucks more water out the soil. So climate change can cause drought by increasing the need for water.

Lastly, there are many places where snow and ice act as fresh-water reservoirs but are vulnerable to rising temperatures. The mighty rivers of Asia (e.g. the Indus, the Mekong, Ganges/Brahmaputra and Yangtze) provide drinking and irrigation water for around 2 billion people. All of these rivers start in the Himalaya and some - e.g. the Indus - flow through and permit agriculture in very dry regions. During droughts and the pre-monsoon period glacial meltwater maintains the flow in the rivers. These [himalyan glaciers are melting fast](#) and this will perturb the rivers' flow. One projection shows increased flow in the Indus in the summer months over the next 50-100 years followed by greatly diminished flow when the glaciers are much smaller.

Fires

Fires seem to be getting bigger and bigger. [Recent wildfires in Siberia](#) have burnt an area the size of Holland and left an area the size of the EU under smoke; this is a triple disaster for air quality, CO2 release and soot darkening arctic ice (thus accelerating melting). [ScienceNews](#) reports on record fires through the Arctic and the resulting carbon emissions. There were devastating forest fires in California in summer 2018; the Atlantic reports that the increasing size of summer forest fires in the state are [caused by climate change](#).

War

Up to now, climate change by itself hasn't been a primary reason for an armed conflict but it has been cited as a contributory factor for the conflict in Darfur and in Syria. It's depressingly likely that climate change will be the primary cause of major catastrophes - e.g. drought, famine and population collapse - and if a country believed that war could provide relief then it would become likely. [A war over water rights from the Nile or the Indus?](#) Or to permit migration of an entire population to a country less affected by climate change? This is speculation but it's not incredible.

A Catastrophic Climatic Shift

Ocean currents and seasonal wind patterns control the weather throughout the world; as climate change continues it is not impossible that some of these patterns will change.

The monsoon in South Asia is a seasonal wind-reversal that brings much needed rain during the summer months to the whole area. If this phenomenon were to stop it would be catastrophic for the whole Indian subcontinent; 25% of the global population would be directly threatened. Of course, it's unlikely to stop; but it could start happening later or it could be less strong (i.e. provide less rain) or it could become stronger (i.e. provide more rain, causing floods) or it could become more irregular. Any of these changes would have a huge impact on the Indian subcontinent.

The Gulf Stream is a current that pumps warm water from the Gulf of Mexico north-east across the Atlantic to Western Europe. This provides a relatively warm climate in Northwestern Europe; Glasgow is almost 1000 Km north of Quebec but has much milder winters. But the Gulf Stream probably has a more important effect; it cools the atmosphere by transferring heat to the oceans. The rate of flow of the Gulf Stream changes over time and we are currently in a period of lower flow. If the rate of flow were to keep falling or, much more catastrophically, it reversed then winters in Northwestern Europe would become much colder while the atmosphere as a whole gets hotter. As [the Guardian reports](#), there's a concern that ice-melt of Greenland and warmer seas could trigger such a change.

This is all, of course, speculation based on the idea of a tipping-point - at a certain point a small change suddenly has a big effect. But, [as Wikipedia discusses](#), it's a concern of climate scientists.

Climate Change Causes

The basic cause of climate change is [the production of greenhouse gases](#) - for flights, industry, electricity production and car journeys. But it's worth reviewing some of the reasons we're producing so much of these gases.

Consumption

It's fairly intuitive that per-capita, [rich countries contribute a lot more to climate change than poor ones](#); those rich countries pump more carbon from sources like power stations, airplanes and cars. What is less obvious is that within a single country there is a very strong correlation between an individual's income and their personal carbon footprint. "Tell me your income and I will tell you your carbon footprint" says [Halina Szejnwald Brown](#) and she shows the same, very clear correlation in two studies, one in the US and the other in China. Kevin Ummel wrote [the US Study](#); on average someone in the top 20% by income pollutes 3 times more than someone in the bottom 20%.

It's obviously a simplification, but if someone earns more, they generally spend more; and almost everything you buy has a carbon footprint associated with it.

Population growth

A simple consequence of having more people on the planet is that they consume more stuff and increase the planet's carbon footprint; [the world's population has more than trebled in the last 80 years](#).

Growth in the high carbon economy

A disproportionately large percentage of the growth in the world economy has been in carbon intensive sectors. Over the last 40 years, the average adult income in the world has risen 64%; but the number of flights has risen by a factor of 6. In the same period in the UK, the number of cars has risen twice as quickly as the population.

Developing Countries are developing

Throughout the world, countries are developing and more of their population are consuming like Americans or Europeans. China's spectacular growth in the last 30 years has fueled its growing carbon footprint. You can see how upward mobility in China at an individual level has contributed to this footprint by looking at meat consumption (increased by a factor of 2.5 in 28 years) or tourism (more than doubled in the last 20 years).

Countries like Russia, Tunisia, Mexico, Brazil and the Philippines provide a growing class of consumers that rival 'traditional' western consumers; for example, in 2018 more than 50% of their adults own a smartphone.

As a nation, China overtook the US as the biggest emitter of CO₂ in 2006 but per capita the USA still emits twice as much CO₂ as China.

Hidden government fossil fuel subsidies

While governments talk green, they often act carbon. In particular, they provide [subsidies for fossil fuels](#) and hence encourage climate change.

Pollution is free

Right now, we are all free to emit CO₂ into the atmosphere; for example I can decide whether to drive or take the train based on convenience and cost without having to account for the much higher CO₂ emissions associated with driving. I'm not charged [the social charge of carbon](#) for my emissions; by and large, the same thing goes for enterprises as well.

Building

55% of the world's population now lives in cities and that is due to rise to around 68% by the middle of the century. This growth in cities spurs a demand for building and this, in turn, contributes to global warming.

Cement is commonly used in all forms of building, but it has a massive carbon footprint. [As the BBC reports](#), "If the cement industry were a country, it would be the third largest [greenhouse gas] emitter in the world - behind China and the US. "

In cities everywhere, the standard choice for a prestige building is the glass skyscraper, even in hot climates like the Middle East. As [the Guardian reports](#), it's a complete folly to build a vertical greenhouse and then install powerful air conditioning to make it liveable. Air conditioning accounts for about 14% of all energy use today; buildings should be designed to minimize its use.

The Convenient Choices Are Often Environmentally Poor

Today, it's usually more convenient to drive than to take public transport; the exception occurs in big cities where parking is a problem and people don't drive. Likewise, it's a lot more convenient to go to the supermarket rather than some local market. Everyone is very busy today, especially if they are working with a family, and convenience is very important.

The Government Pollutes as Well

What is a sustainable value for a personal carbon footprint? In other words, how much carbon can we sustainably produce? There isn't a single accepted value here, but different sources suggest the target is between [2.0 tonnes of CO₂ per person per year](#) to [3.0 tonnes of CO₂ per person per year](#) at the current population of the earth. The world average for 2017 was 4.9 tonnes, so - on average - we have to half our carbon footprints.

But translating that average into targets for each of us gets more difficult. The fairest, simplest strategy would be to say “every country needs to have a personal carbon footprint under 2.5”. Countries already under 2.5 don't need to do anything - e.g. India at 1.7 (in 2014). Countries above that need to act - e.g. the USA at 16.5, China at 7.5, the UK at 6.2 and France at 4.6 (all 2014 figures). This seems reasonably fair; but it's only achievable with **big government changes** as well as personal changes.

The personal carbon footprint isn't really personal; it's the country's footprint divided by its population; some of the country's footprint is from personal consumption (driving, flying, heating, food) and some is from providing infrastructure and public services - including police, roads, libraries, the court system and the military. These public services produce CO₂ and, because they are available equally to the population, they become part of everyone's personal carbon footprint. These public services define a floor for everyone's personal carbon footprint and one study for the US puts this at [8.5 tonnes of CO₂ per person per year - even for a homeless person](#).

Hothouse Earth and Positive Feedbacks

The extreme example of positive feedback is the atomic bomb; it's made of a material where a single free neutron can split a nucleus and release energy plus two or more new free neutrons; if, on average, more than 1 of these new free neutrons splits another nucleus there is a runaway reaction and an explosion. The result of splitting a nucleus splits even more nuclei.

Some results of global warming themselves cause more global warming; they are positive feedbacks. [The 'Hothouse Earth' scenario](#) is that one or more of these positive feedbacks kick in via a tipping point and climate change becomes a catastrophe (even if we rapidly curb greenhouse gas emissions); in its most extreme form, Earth becomes like Venus with very few life-forms surviving. This might sound alarmist, but it is worth pointing out that we're observing that at least 2 of these positive feedbacks (Ice Melt, Permafrost Thawing) are substantially stronger than all previous predictions.

Possible positive feedback cycles in climate change include...

Ice Melt

[As Wikipedia reports](#), ice reflects sunlight; when it melts it can reveal land or sea and these don't reflect sunlight so well - instead they heat up. The earth gets warmer and (of course) more ice is likely to melt as a result. We are currently observing levels of [ice melt](#) that are 50 ahead of predictions.

Permafrost thawing

As temperatures rise and the permafrost thaws, methane is released into the atmosphere; methane is a powerful greenhouse gas and temperatures rise further. The scale of [permafrost thaw](#) observed today is 70 years ahead of predictions.

Air conditioning

As a child I was surprised to learn that leaving the door of the fridge open makes the room hotter, not colder. A similar effect happens with air conditioning; it cools the indoors but warms the outdoors a lot more. But as the planet gets hotter people are turning more and more to air conditioning to stay comfortable. This consumes more energy - [the Guardian reports](#) that air conditioning accounts for about 14% of all energy use now - and of course heats the planet further. [The number of AC units is expected to more than triple worldwide by 2050](#). Air conditioning has a double cost - it consumes energy and uses refrigerants that are the fastest-growing source of greenhouse gas emissions worldwide.

Fires

Hot, dry weather dries out the vegetation and increases the risk of fires starting accidentally or getting out of control (when started deliberately). The drier vegetation also makes the fire bigger once they have started. Climate change makes fires a bigger problem; but the same fires then turn around an increase in global warming by releasing CO₂ and methane (from permafrost they thaw) or covering ice with soot (and absorbing more sunlight). [ScienceNews](#) reports on recent fires through the Arctic and the links to climate change and as I write this the BBC web-site leads with a [report on the fires in the Amazon basin](#); the planet's lungs are on fire.

Populism

Over the past 5 years or so, more countries have fallen to forms of populism; the USA, Brazil, Italy, the UK, Turkey, India and Hungary. The specifics vary in each country but two common threads are hostility to both migrants and policies that promote climate change. This reaches its nadir in the USA where extreme migrant hostility and nationalism was a key thread used by Trump in his election in 2016. Since then he has enacted a whole host of policies that [accelerate climate change](#). Climate change is a prime cause of migration from Central America to the US; and describing this migration as an 'invasion' and an 'emergency' is part of Trump's re-election strategy. If he is successful it's not hard to see how Populism -> Climate Change -> Migration -> Populism could form a positive feedback cycle.

The Global Crisis

Unfortunately, climate change isn't the only serious problem we are facing. There are a set of other crises that together form what I've called the Global Crisis. I've divided these into environmental crises and social crises.

Environmental Crises

The environmental crises are all about how humankind exploits the planet.

Climate Change

I've put this here just for completeness; it's described in its own section [here](#).

Pollution

Pollution happens when waste is left in the environment. Pollution can be deliberate but legal (e.g. fine particle air pollution from cars), deliberate and illegal (e.g. an oil-tanker cleaning its tanks out at sea) or a genuine accident (e.g. lead pollution from a fire in a church). Pollution passes the cost of dealing with the problem from the producer to someone else - it's usually a deliberate business strategy.

The worst pollution problem today is that of greenhouse gases. Like many pollution problems it is long term - we are suffering from the pollution put out by previous generations. Given that [the dead outnumber the living by a factor of 13](#), we're lucky that our ancestors weren't as 'advanced' as we are - in practical terms pollution has only been a serious problem for the last 100 years. But since then pollution has been a growing problem for following generations.

The climate crisis is affecting water quantity; but pollution is producing [a less visible crisis with water quality](#) that affects food production, health and can 'cost' an affected country or region 30% of its economic output. Fine-particle air pollution was the [fifth leading cause of death worldwide in 2015](#). Plastic pollution seems to be everywhere, in the form of bottles, bags or microparticles; [in the ocean](#), on the ice-cap, [inside plankton](#) (and thus being eaten by many marine animals), in our drinking water and in the stomachs of dead marine mammals. Much of mankind's waste - pesticides, detergents, pharmaceuticals, cigarette stubs [and even caffeine](#) - end up in the oceans.

In many cases, we don't know what this pollution will do to us or the planet; we often find a useful new technology (e.g. PCBs, asbestos, diesel) and then find out about the long term health effects later.

Water Scarcity

Benjamin Franklin said “When the well is dry, we know the worth of water.” Imagine how the citizens of Capetown felt when they were given a day zero when their water would stop flowing. Imagine living in Chennai (a modern city in India) and having your water supply cut (like 90% of the city's population) and you have to get water from a public tap controlled by gangs. Imagine if you know the only drinking water available to you is polluted. Imagine spending most of your day worrying about water.

This is a reality for much of the planet. According to [Wikipedia](#), two-thirds of the global population experience severe water scarcity at least 1 month of the year; half a billion people in the world face severe water scarcity all year round and half of the world's largest cities experience water scarcity. The causes range from climate change, pollution, overconsumption by agriculture or industry, population growth and underinvestment in infrastructure.

Falling Biodiversity

Nature is full of complex food chains and systems where - through the miracle of evolution - species interact as though they had been 'designed' together. If a species is lost in some of these systems - for example bees pollinating flowers - then the entire system can break down; in this case, we get no fruit and nuts (or honey). Losing something at the base of a food chain - e.g. a type of plankton - can wipe out several species in a system in an area. Sometimes we can clearly see these effects - e.g. commercial fishing is less productive - and sometimes the result is more subtle - e.g. one species is wiped out, a second species replaces it in the system, but it has no natural competitors and it decimates a third species several years later.

But the very diversity of nature is failing; species numbers are declining and some are threatened with extinction. Crucially, [75% of flying insects in Germany have been lost in 25 years](#). Insects act as pollinators but also eat pests, decompose waste and are the base of many food chains. Most scientists think that 'if the insects go, then so will we'. There are many other examples of threatened life-forms; corals that protect coasts, mangroves that purify water and birds that eat pests on crops.

There are many likely causes for this loss; climate change, pollution, loss of forests, overuse of pesticides and overfishing. Perhaps the most likely reason is the industrialization of agriculture; we cut down forests to [farm more intensively and we rely on only a handful of industrially produced crops](#) using lots of pesticides and fertilizers. As a personal, non-scientific observation, maize is cultivated near where I live; you can walk through these huge fields all day without seeing **any** animals - farmers included - or other plants; an industrial monoculture that seems designed to snuff out biodiversity.

Biodiversity is hard to understand and to explain, but [many scientists feel its loss is more serious than climate change](#).

Food Production

Modern intensive agriculture has allowed the planet to continue feeding itself as the population has grown. But - in addition to climate change and biodiversity problems already discussed - there are a few signs we may be reaching the limits of food production.

The first problem is that we are [running out of agricultural land](#); if we want to grow more stuff, then we need to cut down forest and that increases climate change. This problem is amplified when we consider the growing demand for meat worldwide - it is a much less efficient way of using land to produce food.

The second problem is that agriculture is increasingly industrialized, with a handful of big businesses maximizing their profit at the expense of the community at large. Producing unhealthy but profitable food, polluting water streams, reducing employment, [depleting soils](#) and reducing biodiversity - [these are all things that big agribusiness does](#). Compared to traditional farming, industrialized agriculture generates more greenhouse gas emissions directly (e.g. through the more intensive use of fertilizers) and indirectly (e.g. through more transportation, refrigeration and packaging).

Industrial farming seeks to maximize profit; a high level of mechanisation allows a few people to produce a lot of food. That's one measure of efficiency; another measure is to sustainably feed a lot of people from a given amount of land. This second approach is more labor intensive - maybe using smaller fields and crop rotation rather than more fertilizer - but it's better for the planet as a whole. Agricultural subsidies often disproportionately benefit industrialized agriculture - e.g. the EU's CAP [works by farm area rather than sustainability](#) and the same sort of thing is [happening in the UK](#).

Inside Climate News has an [excellent article on the problems of industrialized architecture](#).

Social Crises

Some of the crises we are facing aren't directly related to how we exploit the planet, they are more about how we relate to each other.

Inequality

In the western world, economic inequality has risen substantially since 1980 both in terms of income (what you earn in a year) or wealth (the sum total of everything you own). According to the [World Inequality Database](#) from 1979 to 2014, the 'share' of the USA's top 1%'s income went from 11.2% to 20.2%; if we look at wealth it went from 22.4% to 38.4%. Compared to the population as a whole, the rich got a lot richer in the USA during those 35 years. This isn't some sort of accident; when Reagan became president in 1979 the top tax rate was 70% and in 2014

it was 39.6%. Deliberate economic policy (call it neoliberalism, Thatcherism, Reaganomics or Reaganism) made the rich richer.

In Europe and especially the USA the less fortunate feel that they aren't getting a fair share of any growth. In the USA from 1979 to 2014 the average income for the bottom 50% is essentially unchanged when allowing for inflation (when the average income grew 56%, allowing for inflation); in a **35 year period of substantial growth, the bottom 50% got nothing**. Again, this isn't an accident; it's deliberate government policy; it's economic apartheid.

This economic inequality has two horrible results. First, it needlessly causes great economic stress for a large part of the population - imagine having to choose between food or medicine. Second, it leaves a huge part of the population unhappy and resentful (Meik Wiking claims in *The Little Book of Lykke* that "the biggest obstacles to happiness are feeling inferior or excluded").

But it also provides an opportunity. Even with voter suppression and minority rule, the votes of the economically disadvantaged are important; they will be attracted to a comprehensive plan that addresses inequality as well as climate change. And those that have done very well out of this inequality - e.g. the 1% of the population who now own 40% of its wealth - can now contribute more fully to society by helping to finance a fairer solution.

Automation and AI

Ten years ago the idea of a self-driving car seemed a long way off; well, at a technical level we are now there. Artificial Intelligence has advanced tremendously quickly, exposing many more jobs to automation and changing our day by day experiences. For example, it's not unlikely that within 5 years you can walk into the supermarket, take the goods you want and walk straight out; cameras will recognize you, see what you buy and charge you. Very quick and convenient for you, of course, but not so good for local employment.

Much of the automation technology will be provided by high technology companies. Today, these companies are all American and very big; Amazon, Facebook, Airbnb, Google and Uber are virtual monopolies. This isn't an accident; Silicon Valley uses several techniques - e.g. the "Get Big Fast" approach (grow quickly even if you make a loss so it's hard for a competitor to get started), the network effect (when you have a lot of users, you become more interesting to new users), the abuse of patent law (hit start-up competitors with bogus patent lawsuits) and buying out competing start-ups - to restrict competition. High technology companies employ fewer people and run higher profit margins than conventional companies; Facebook has a profit of \$25 billion with only 40,000 employees while VW has a profit of about \$16 billion with more than 300,000 employees. High technology companies are multinationals; they generate a lot of income outside of America, without contributing much to the local economies in terms of employment or paying taxes.

It's very reasonable to expect big changes in commerce and employment going forward. But it's harder to predict the exact changes. Will self-driving cars vastly reduce the number of car makers? Will supermarkets have to buy automation technology from Amazon to be competitive? How do we protect our data and democracy from abuse? Will farms be entirely automated, where machines do all the planting and harvesting? Will the workplace be even more divided up into knowledge workers (highly paid jobs that are hard to automate) and drones ('free-lancers' paid to do low skill jobs that aren't worth automating, like to deliver a meal to someone's house)?

However all this works out, the idea of full-time employment for everyone for all of their working life is no longer credible.

The Cause of the Global Crisis

Consumerism

GDP is a measure of how much a country produces. CO2 emissions of how much it pollutes. There's [a very strong correlation between the two](#). Consumption means production which means pollution.

Everything in today's society is set up for consumption. We're constantly encouraged to want the latest thing; as Apple releases the iPhone 27 (a vast improvement over the iPhone 26...) it has already started work on the iPhone 28 (a vast improvement over the iPhone 27...). Today's business model means Apple needs to keep growing; if it actually produced an iPhone everyone wanted to keep, well that would be bad. While Apple told us the iPhone 27 was great back then, its publicity will persuade us to feel unhappy with it now, because the 28 is so much better. Consume, enjoy briefly, feel dissatisfied, consume again etc etc. And in order to consume again, we work hard to earn money, producing some product or service that itself has a pollution footprint.

The consumer society is what is driving the Global Crisis. It isn't making the population as a whole happier (always wanting something you can't quite have isn't satisfying). Automation is likely to increase the number of the unemployed and the underemployed; their hardship is even greater in a consumer society.

Visualizing and Tackling the Global Crisis

We can crudely summarize the Global Crisis by saying "as a population we consume more resources than the Earth can sustainably provide". This overconsumption is the cause of the 5 Environmental Crises - climate change, pollution, water scarcity, falling biodiversity and food production. How this tragedy will play out if we continue growing earth's population and maintain our current levels of overconsumption will vary from country to country. But it's likely that we'll start to run out of food and water in some countries in around 30 years; there will be widespread

suffering in almost all countries in around 50 years; within 100 years populations will be declining in every country before a more rapid collapse.

It's fundamentally the same overconsumption that leads to those 5 crises. We all drive a lot; this pumps CO₂ out into the atmosphere and also causes air pollution (from the driving, but also in the refining and transportation of the fuel). We all drink bottled water; this causes plastic pollution (from the bottle), emits CO₂ (from the manufacture of the bottle and its transportation) and falling biodiversity in the oceans (from the plastic). We all eat Brazilian beef; this was fed from pesticide-laced soy on land cleared from the Amazon, the cow burped out a lot of methane and then there is all the shipping - a lot of climate change, but with food production and biodiversity problems.

In these examples we see how one act of consumption contributes to two or more of these crises. The biggest crisis is climate change, so we can posit an approach - [if we manage our carbon footprint successfully, then we will improve the other crises too](#).

Very approximately, [global emission of around 20 billion tonnes of CO₂ per year is sustainable](#), so we need to stay at or below that limit. We can express our emissions via the formula

CO₂ Emission = Population * Avg Consumption in \$ * Avg CO₂ Emission Per \$ Consumption

The important thing about this is that it suggests three ways to lower CO₂ emissions - via lowering population or consumption in dollars or the average emission per dollar consumption. Given we are pumping out CO₂ at around double the sustainable limit, any fix needs to be radical. We ought to

- a. Maintain the earth's population at its current level.
- b. Reduce the average consumption in dollars - i.e. consume less.
- c. Make each dollar spent produce less CO₂ - i.e. consume smarter.

Population growth predictions

[Our World in Data](#) and [Wikipedia](#) both predict today's population of 7.7 billion rising to 10.9 billion in 2100. More people means more consumption, so this will worsen the Global Crisis.

Most alarmly, in both reports most of that population growth is projected to be in Africa, from today's population of 1.3 billion to 4.3 billion in 2100. One can look at this optimistically - on average an African consumes less resources than, say, a European, so the growth might be sustainable. But I suspect that Africa will suffer more from climate change than just about anywhere else and I'm struggling to see any way that Africa could sustain such a population growth. As I write this, Larry Elliot seems [just as alarmed in an article in the Guardian](#).

Society can only acceptably influence human population through medium to long term policies, so this makes it more imperative than ever that we **consume less and consume smarter**.

Technological Fixes

There are various technological fixes that, at least theoretically, could be used to reduce or manage climate change.

Carbon Capture allows CO₂ to be removed from the air or an exhaust flue of a power station; this CO₂ could then be sequestered (stored underground or in the ocean depths) or used to make a synthetic fuel. When used on power station, this technique reduces (but doesn't eliminate) CO₂ emission in the generation of electricity - but it doesn't make it carbon-free. Direct capture from the air powered with renewable energy could, in theory, lead to negative CO₂ emissions in the future, but the process requires a lot of energy and water. It's has been shown to work in small scales but (to put it mildly) there's considerable doubt the process could scale sufficiently.

It's very likely that the cheapest way to remove a tonne of CO₂ from the atmosphere will always be to not put it there in the first place (the easiest way to put toothpaste back in the tube is not to squeeze it out in the first place). So we can't pollute as usual because we'll be able to develop this great technology that will be able to 'unpollute' in the future. We need to radically cut our CO₂ emissions now.

Another technological approach to prevent the planet heating up is to modify the clouds in the atmosphere. Ideas include releasing aerosols in the upper atmosphere or changing clouds (e.g. spraying salt in them), both with the goal of reflecting more sunlight away from earth. The idea here is not to reduce our carbon emissions, but to take other steps to cool earth. This approach hasn't been tried and is controversial; it's geo-engineering with a high 'unintended consequences' potential.

In the next few years expect to hear dubious claims of technological solutions for climate change. But be very suspicious, especially if these claims are used to back a 'pollute as usual' policy. If something sounds too good to be true, it's probably because it's too good to be true.

Accounting Fixes

I recently booked a flight (it should be my only flight of the year...) and, as I was paying, I was asked if I wanted to 'offset' the CO₂ my journey would generate by paying less than 1 Euro. I know how much CO₂ my flight will generate and I know the [social cost of carbon](#) so I would expect to be paying at least 100 Euros. It turns out that you can [buy offsets for CO₂ at around 1% of a well accepted social cost of carbon](#). I tried to find out more about what I would really be buying for my 1 Euro, but there was no information available on the web. It seemed like 1 Euro for a cleaner conscience, but maybe not for a cleaner planet. So I didn't pay for the carbon offset.

At a much bigger scale the UK government recently [announced plans to be carbon neutral by 2050](#). I've read several articles about this and they don't go into details but there appear to be two big gotchas. The first problem is that it assumes that carbon can be captured from the atmosphere and stored - i.e. that a technological fix can be developed. The second is it proposes to use carbon credits, where the UK buys carbon offsets abroad and 'subtracts' these from its own carbon emissions to come out as 'carbon neutral'.

So what happens when you buy a carbon offset? You typically contribute to some project that should reduce carbon emissions elsewhere - for example, you fund a wind farm construction or a programme to improve home insulation or the planting of some trees. Often this activity takes place in the developing world, because labor is cheaper there. The cost of the purchase can vary wildly - one report gives a range of [\\$0.10 per tonne to \\$44.80 per tonne](#). One thing that affects the price is whether you get a certificate saying what you actually bought. In 2016, individuals purchased [carbon offsets for 63.4 million tonnes of CO2 emissions](#) - around 0.2% of the CO2 emissions that year - for a very low average price of \$3.00 per tonne.

I'm very unconvinced about this approach. First, I suspect there is a lot of dubious accounting and even outright fraud in some of these schemes. Second, in many cases the offsets will be funding something that would have happened anyway (e.g. the wind farm would have been funded differently). But the biggest problem is it gives the western world a simple 'solution' and 'justifies' polluting - one report says that "[Americans can purchase offsets and neutralize their carbon footprint for less than \\$100 a year](#)". Climate change can't be tackled if the west keeps pumping out CO2; the developing world can't plant enough trees or insulate enough roofs to compensate for that.

To paraphrase George Monbiot, [the developed world needs to get its carbon problem under control rather than paying the developing world conscience money to pretend to do it for them](#). Just as you should be wary of 'magic' technological fixes for climate change, be very careful of dubious accounting fixes.

Living in today's society....

“A single child's death is a tragedy, the death of a million is a statistic” to misquote Stalin. It's sometimes more real to look at how changes will affect individuals, rather than whole countries. So here are some lives in today's society where we do nothing about climate change. It's 'business as usual' with an emphasis is on the short term and the rights of future generations are ignored and corporations' profits are given priority over people's wellbeing.

Martine : 2025

The year is **2025** in today's society. **Martine** lives in a modern house in a medium sized town in a fruit growing area near the Alps in France with her husband and children. For the past few years, the summers have been getting hotter; there are typically one or two heatwaves in each summer with day-time temperatures above 40C and night-time above 25C. Summers are noticeably more uncomfortable and Martine would like to install air-conditioning but her husband is worried about the cost.

A more urgent issue for the family is the violence of some storms in recent years and the cost of home insurance; it seems that the extra temperatures are causing more violent, extremely localized super-cell storms (essentially, a storm from a single huge cloud). Last year every building in a nearby village was damaged by hail the size of tennis balls; the roofs on some buildings were completely destroyed and the then unprotected building were thoroughly drenched. There have also been a handful of small tornadoes that caused a lot of damage. Local fruit farmers have been hit hard by those storms; all the trees in some orchards have been damaged; replanting is the only way forward but they won't produce fruit for five years.

Insurance companies have no good way of calculating the increased risk and have savagely increased the cost of home insurance premiums in Martine's area; they say that the nearby mountains increase the risk of extreme weather. The insurance company will offer a lower premium if they completely upgrade their house to new standards but that would cost far too much. Martine feels they really have to find the money to maintain the insurance on her home but she's worried that premiums will continue to rise and at some point they won't be able to afford home insurance.

Jane : 2027

The year is **2027** in today's society. **Jane** is 25 and lives in Sheffield in the UK with her parents in a modest terraced house. Her father was a lorry driver; a difficult, lonely job but one that provided reliably for the family. But he has lost that job to automation; lorries now drive

themselves. The local economy isn't very strong and Jane's father hasn't found a full-time job. He works on a zero hour contract where he occasionally drives the very beginning or the very end of a lorry journey; the automated driving still has trouble driving in some awkward spots. This work only averages a few hours a week and, to add insult to injury, he knows he is teaching the automation software as he does these small driving tasks. Jane's mother didn't work before but now she also has a zero hour contract where she helps a delivery company when it is busy; she averages 2 days a week.

Jane was a hard working, promising student at school with preference for engineering subjects. She would have liked to have gone to university but it simply wasn't financially possible. Instead she now works for a large web retail company at a huge warehouse on the outskirts of town; she fills orders. It's exhausting work; every minute of her working day is monitored by technology - she is always being timed and judged. She frequently has to work shifts; one strategy for getting through those is to treat it as a sport or keep fit activity.

On the other side of the road from the vault like warehouse are the company's offices; they are modern, clean and covered in glass. But it's not just the architecture that is very different; the people working on either side of that road operate in different worlds. In the shiny offices, knowledge workers control the whole enterprise; they plan the ever increasing automation in the warehouse, negotiate contracts with suppliers or delivery companies and monitor every aspect of the company's performance. Salaries, working conditions and status couldn't be more contrasted on the two sides of the road.

Jane has tried to get a job in the offices, but for that she needs a degree. To do that, she needs enough money to go to university, so she is trying hard to save money - she can't consider leaving home right now. If she gets to university she hopes to continue working for the delivery company for 15 or 20 hours a week. Life seems very hard for Jane; if university cost less or her family was a little better off she would now be a graduate in a well-paid satisfying job. Everyone in the family feels they have been left behind as the world moves on; they work hard but they are poor and insecure and they all resent it. They feel bombarded with images of products and life-styles they can't afford; the day seems to be filled with reminders of their status as losers. You can read about Jane's better life in a Modern Society [here](#).

Vicente : 2028

The year is **2028** in today's society. **Vicente** is an indigineous quinoa farmer in Salar de Atacama, Chile. Lithium mining has become the biggest economic activity in the area. It's an activity that consumes lots of water in one of the driest places on earth. The lithium is extracted by pumping salt-water into a hole in the ground; this mineral rich water is then left in evaporation pools for up to 18 months and lithium is then extracted from the remaining salt. Lithium is used to produce batteries used in smart-phones, electric cars and all sorts of 'green' products; demand for it is exploding. From the modern world's perspective, the lithium provides a clean

way to store electrical energy. From Chile's viewpoint, it's a way to get valuable foreign currency.

But Vicente sees it rather differently. The mining leaves heaps of salt behind - but that's only visual pollution. Fresh water canals have been polluted with mining waste, turning the water blue. But the effect on fresh-water supplies in the area is the most significant problem. It takes 2,000 tonnes of water to make a tonne of lithium. The water pumped into the mines is extracted from salt water aquifers faster than they are being naturally replaced (through rain etc). For the last ten years there was some doubt, but it is now known that the salt-water aquifers are connected to the fresh-water aquifers used by the local population and these are now much lower as a result. For the last few years Vicente has spent more time and money getting enough water to grow his quinoa and he sometimes has to have fresh water bussed in; when he does so, he has to pass this cost when he sells his quinoa. Local llama farmers complain that since mining started their grazing land has gone from being lush to being barren. The Lithium Triangle straddles Chile, Bolivia and Argentina and has over 50% of the earth's reserves of lithium but it's possible the indigeneous people living there will have to move elsewhere.

Marlyn : 2029

The year is **2029** in today's society. **Marlyn** has just collected the Pulitzer Prize for Journalism she shared with her murdered husband Jerry. He was researching a story exposing the new giant carbon capture plants being developed throughout the western US. These plants were supposed to capture CO₂ directly from the air using electricity generated via renewables (most of them were surrounded by wind or solar farms) and then store the CO₂ deep underground. The plants had been in development for over 8 years and were advertised as being the 'technology solution' to climate change. The plants' developer was heavily subsidized by the federal government and both had heavily 'talked up' how the plants would 'scrub' the air.

The problem for Jerry was that the numbers didn't add up; the solar or wind farms just weren't big enough to provide enough electricity to remove the claimed amount of CO₂. As Jerry did his research it was clear that both the plants' developer and the government knew this; they planned to extend the capacity in the future but it was at least 5 years before they'd hit the announced capture figures.

But before Jerry could complete his book he was mysteriously shot. At the time of his murder, Jerry's conclusions were not public knowledge, but he hadn't hid what he was working on. Despite a long inquiry, the murderer was never found, nor was any motive discovered. Fortunately, Jerry had shared his conclusions and research with Marlyn; Marlyn wasn't a journalist but she decided to make a book out of Jerry's work and his murder. She developed the story in secrecy; its publication 9 months after Jerry's murder was a sensation. The carbon economy tried to rubbish Jerry's conclusions; politicians attacked Marlyn's character and motivations; they were unsuccessful and only managed to associate themselves in the public

mind with Jerry's murder. Comparisons were made with Putin's Russia. The US public's trust in their government and the carbon economy over climate change never recovered.

John : 2030

The year is **2030** in today's society. **John** is a soon to be ex-farmer in Iowa. Over the last 50 years, the families, farms and communities that made up the American midwest have been replaced by agro-industries using robotized farm-machinery to produce cheap food stock on mega-farms. In the eighties, 160 acre family farms that produced cattle, pigs, corn, soy, wheat, beans, hay and oats were gradually bought out and became part of larger operations producing corn and soy to feed animals reared in their own giant, factory farms. Family farms that stayed in business starting selling their grain directly to those same agro-businesses; they gradually went from being independent food producers to being growers. Mixed farming was replaced by huge, more industrialized mono-cultures. Every problem (e.g. failed harvests and banking crisis) hurt small farmers more than big business and accelerated this consolidation. The government actively encouraged this industrialization through corn subsidies, making it economic to produce fuel for vehicles and industrial processed food (e.g. high-fructose corn syrup).

Over the last 15 years the use of robotized machinery, where one operator could remotely control a dozen harvesters, cut employment further and many of the small towns that used to dot the prairie became ghost towns; John's children spend 2 hours travelling to school each day and have no friends living nearby. Over the same period the weather seems to have changed; rains are heavier but less frequent; the summers are a lot warmer and springs often involve flooding. Soil is being lost and fertility is reducing. But for John right now the biggest problem is water; warmer summers need more water for growing and that means irrigation. John could provide this by drilling down to the aquifer but he would only be allowed if he leaves some fields fallow each year to replenish the aquifer; he simply can't afford to do this.

So John is about to declare bankruptcy and this means he will lose his 150 year old family farm; a big agro-business is sure to buy the farm for peanuts. John is bitter; the whole midwest now feels like an automated outdoor food factory, owned by and run for the profit of the agro-industry. John and his family intend to move to the Chicago area. He doesn't really have any marketable skills but he's sure he can find something easier to do than farming. The real incentive for the move is his children; they will have a school and friends nearby and every chance for the future. You can read about John's better life in a Modern Society [here](#).

Sam : 2032

The year is **2032** in today's society. **Sam** is a salmon fisherman in Alaska; it's a hard, dangerous way to make a living. Over the last 10 years his catches have been getting smaller and smaller; there are fewer fish and they are smaller. Ocean acidification is the cause; as CO2 levels rise in

the atmosphere, more of it dissolves in the ocean and the water becomes more acidic. This affects the entire marine ecosystem; in particular it makes it much harder for marine life that uses a shell of any type. This includes the plankton at the base of the food chain for commercially important fish like salmon, halibut and pollock. Other fishermen - including crab fishermen - tell the same story; there's talk of the end of commercial fishing in Alaska within 15 years. Sam can't see any solution to his problems; he could sell his boat and permit, but everyone is suffering from the same problem he'd struggle to find a buyer that would allow him to repay his loans. He is reluctant to declare bankruptcy but he has started to investigate all the legal repercussions. For Alaska, things are even more serious; the fishing industry accounts for 10% of the jobs in the state.

Juanita : 2034

The year is **2034** in today's society. **Juanita** is from Guatemala and lives illegally in Miami with her young family. She and her husband grew up in the coffee growing area of Guatemala but persistent drought, induced by climate change, has decimated the harvest and the whole economy. So they reluctantly migrated illegally to the US 10 years ago and have been living in the shadows ever since.

They only recently moved to Miami with a group of fellow migrants; being in a group offers a degree of protection when living illegally. Miami is built on limestone and especially vulnerable to sea level rise, because water seeps up through the ground. Rising sea-levels and delays in approving a \$3.2 billion sea wall mean that roads, car parks and buildings are regularly flooded; it's too late to build a sea-wall now. When insurance companies decided to no longer cover property in Miami, it triggered a collapse in the economy. All building stopped immediately. Those who could afford to do so moved out and the whole property market collapsed. With a much reduced local tax base, downtown Miami has become a ghost town, without electricity or a functioning police force. The condos that once housed rich retirees are now boarded up and squatted by illegal immigrants like Juanita; they find safety in the growing number of ghost towns throughout the country.

The same story is repeating itself around the USA's coast; most cities are in slightly better shape than Miami, but only because they aren't quite as susceptible to flooding. The federal government has refused to get involved in defending coastal cities and the cost of that defence is too much for all but a handful of cities. Ambitious sea-wall building projects have been launched in Manhattan and San Francisco amid considerable doubt they can be saved in the long term. Republican politicians complain that entire cities have been lost to 'immigrant infestations' while denying there is a climate crisis never mind their role in promoting it.

Omar : 2035

The year is **2035** in today's society. **Omar** is a young recruit in the Egyptian army and he is participating in a highly publicised military exercise. The exercise is taking place on the Aswan dam and simulates the capture at night of a dam under construction and its destruction. The exercise is all part of the ongoing cold water wars between Egypt and its upstream neighbors on the Nile. Against the Egyptian government's objections, Ethiopia is taking more and more water from the Blue Nile at its Grand Renaissance Dam. Over the last 20 years Egypt has become one of the most water stressed countries on the planet; most domestic water supplies have been cut and people now queue up at public water taps. With reduced water, agricultural output is much reduced; food prices have rocketed and hunger has become the norm for the poor. The population of Ethiopia has almost doubled in the last 30 years and it needs more water to feed its population. Sudan is also proposing to build a new dam which would further reduce Egypt's water supply. For propaganda purposes, the goal is for maximum realism in the military exercise; the hope is to avoid a real war but tensions have been escalating over the last 20 years.

Li Qiang : 2037

The year is **2037** in today's society. **Li Qiang** is an agricultural worker near Jinan on the North China plain. It's summer and he has to be very careful with the heat; it's perfectly possible to become ill or even die working outdoors at this time of year. Today will be hot and he has to wear his most effective 'cold suit'; this features a thick refrigerated waist coat with an attached battery powered cooler and looks like a mini-space suit. When he is inside a tractor or indoors, he can recharge the battery. Automation and planning around the weather minimizes the time Li Qiang spends outdoors during the hottest days, but he still has to wear special clothing most of the summer; the vast majority of the population on the North China plain - especially in the big cities like Beijing and Shanghai - never go outdoors in summer. He has to monitor his exposure to the heat as carefully as nuclear workers monitor their exposure to radioactivity. He finds it a bit ironic that he has to dress like a space-man to farm like his ancestors but he knows workers in poorer countries die in their fields, so he is glad of the protection.

Jamel : 2040

The year is **2040** in today's society. **Jamel** is Moroccan and comes to France to work each summer. He is a security guard in Aix-en-Provence, a beautiful, once wealthy town in the south of France that is essentially abandoned during the summer months when most days have peak temperatures above 45C and night temperatures above 30C. Tourists still stream to Aix, but only from October to May. As a result, the town is almost as seasonal as a 20th century ski-resort. Some wealthy Aix residents summer in northern Europe or the mountains and only

return in the fall. Most tourism workers only come for the season and rent property that is empty for the rest of the year. So in summer a small army of people like Jamel come to Aix to protect all this empty property. This work is too hot for French citizens (even with high levels of unemployment), so the French government introduced special summer visas for people like Jamel and agricultural workers; the visas don't allow the holder to travel freely in Europe or to change job. Jamel doesn't like working in France - he feels resented as a foreigner - but there is very little work in Morocco (summers are even hotter there) and he doesn't really feel he has a choice. Right wing politicians in France complain that there are too many 'foreigners' and 'invaders' in France, but they don't pursue any policies to reduce the climate crisis. You can read about Jamel's better life in a Modern Society [here](#).

Imran : 2085

The year is **2085** in today's society. **Imran** lives in a large village in Pakistan's lower Indus valley. Rainfall has always been scarce in Imran's region; villages depend on the river for agriculture and drinking water. Massive irrigation systems have allowed the cultivation of rice, wheat and cotton in this arid area. The source of the Indus is the Tibetan plateau, the planet's third largest store of ice. During the pre-monsoon period and droughts (often monsoon failures) the Himalyan glaciers have always acted as water reservoirs, with meltwater allowing agriculture to continue.

But for the last 100 years these glaciers have been melting fast due to rising temperatures and soot deposits (caused by air pollution from the densely populated Indo-Gangetic Plain). This boosted the flow in the Indus during the summer months for the first half of the 21st century; flooding became a bigger problem than drought. Now, however, almost all of the glaciers are gone and the flow of the river is a fraction of what it was. Instead of using the period of relative plenty to plan for reduced water supplies (e.g. develop improved irrigation systems, to transition from 'thirsty' crops like cotton and rice to more suitable ones like wheat, millet and beans), the government squandered the opportunity.

Droughts and oppressive heat are now standard in summer and working in the fields can be life-threatening on the hottest days. Monsoon disruption is another feature of the climate crisis. The collapse happened very quickly and all of Pakistan is now a poor, hot, dry country; there is nowhere for Imran to go. He has lost all his 3 young children to malnutrition; he is looking at his small crop of wheat shrivel in the heat and he fears for his wife and himself. The population of Pakistan has halved in the last 20 years and the fall looks likely to continue. This pattern is being repeated all over Asia where great river systems (e.g. the Mekong, Ganges/Brahmaputra and Yangtze) that start as meltwater from glaciers once provided water to 20% of earth's population.

Edward : 2090

The year is **2090** in today's society. **Edward** is the Canadian environment minister and he is going to the United Nations to discuss climate change with other governments. Canada is one of a small number of countries that have actually prospered during the climate crisis; others include Russia and Argentina. Those winners have become more temperate and actually have modest levels of economic and population growth.

The biggest losers include the hottest countries in Africa, Asia and Central America and flat countries overwhelmed by sea level rise like Bangladesh and island nations; migration and starvation have left many of these countries essentially uninhabited. In the first half of the century the USA resisted the worst effects of climate change with a gradual migration northward. But this all accelerated when the water supply in the Colorado basin collapsed around 2040; south-western states like Arizona were abandoned and the national economy collapsed. Alaska is now the most populated state in the US and the country has entered negotiations with Canada to buy part of the Yukon.

The earth's population now stands at 2 billion, down from the 8 billion early in the century. It's generally accepted that the only way to maintain this population is to allow people to migrate towards the poles, crossing country boundaries and farming intensively in the high latitudes. Countries like Australia, the USA, Italy and Hungary that resisted migration in the early part of the century now advocate it as a solution; it's now the turn of northern countries to be more skeptical. Radical solutions where one country rents another's land or several countries unite to form a new country are being discussed. Canada hasn't decided on its approach; on the one hand it holds the strongest cards but the USA and China are still strong military powers and it isn't impossible they will take the land they need by force.

Developing a Modern Society

The consumer society is leading to the Global Crisis; human overconsumption and pollution of the earth's resources for short term profit or pleasure threatens human kind and the whole ecosystem on Earth.

Unless we tackle this crisis, we are going to have severe misery in large parts of every country within 50 years. So we can't do nothing - or very little - and hope the problem goes away by itself. We have to either tackle the problem (now) or deal with the consequences (later). It's a question of big changes now or catastrophe later and I've opted for the big changes now.

Rampant consumption is the problem; half measures (e.g. avoiding plastic straws, small extra taxes on fuel) are woefully insufficient; today's society is a consumer society and we need to replace it with a Modern Society that sustainably protects the planet and its people.

Today's society	A Modern Society
Corporations	People
Rich and powerful	Everyone
Short term	Short, medium and long term
Individual profit	Benefit to society as a whole
Extreme inequality	Economic justice
Economic Output	Quality of Life
Exploitation	Sustainability
Me	Us

You can read some justification for my thinking (e.g. why we need this Modern Society) in the [FAQ](#).

Action Plan for a Modern Society

Here is a plan to move towards a Modern Society. Some of these could be introduced immediately, some would have to be phased in.

1. Reduce working week to 4 days

We want to reduce consumption and production, so a good place to start is by reducing the length of the working week. This has an immediate benefit in terms of quality of life for almost everyone. An opinion piece in the Guardian quotes [a number of studies saying this would reduce people's carbon emissions by 10% to 30%](#). Companies that have switched to a 4 day week have [reported a number of benefits](#).

Employers would only pay workers for their 4 days work; the government would pay the fifth day at or near the country's minimum wage. This obviously would cut people's take home wage if they were earning above the minimum wage but the poorest in the population would be largely unaffected financially. The longer term goal would be to introduce some form of [Universal Basic Income](#) and essentially this is what we are doing for the 5th day.

2. Volunteering replaces unemployment benefit.

There are a lot of public services we want to provide and they obviously need to be staffed and the staff paid. The idea for the most part is to staff them with volunteers and to pay the volunteers at or near the minimum wage. As part of this we assume there are enough jobs for everyone that is unemployed, so we stop paying unemployment benefit and we let them volunteer. Some volunteers will be unemployed, some will be retirees and some may not want a normal job at all (e.g. a stay at home parent when the kids have moved out).

Volunteering allows people to work relatively flexibly but with security; e.g. an ex-teacher might volunteer to tutor two days a week. Volunteers might work in public parks, swimming pools, drive school buses, tutor, libraries, museums, local food cooperatives etc.

Part of the rationale for no longer paying unemployment benefit is that volunteering provides a better solution; people re-engage in society, they can learn a trade and they are doing useful work. It's also more predictable than zero hour contracts (these are used in countries like the UK) so people will move from zero hour contracts to volunteering and employers will be less able to force those contracts on people.

3. Radically better public transport

We want to encourage people to leave their car at home or, better, not buy one in the first place - so the first thing we need to do is to provide compelling public transport.

Town and city centers would be car free and pedestrian friendly almost everywhere (with an exception for the handicapped). Towns and cities would offer free public transport. Cities would set up free car-parks / places for ride-sharing just outside the car-free zone. This is all part of a process of making town and city centers more attractive for people and commerces (and reducing the power of drive to shopping malls).

The countryside has rather different problems; it's less easy to provide alternatives to the car. The first thing is to have a good system of school buses so that parents don't drive to school to pick up their kids. The next step would be to extend the school bus service in terms of hours so it could be used by commuters as well. They'd generally take commuters to train stations or ride-sharing car parks.

Well managed pools of electric cars would allow more people to drive on demand without owning a car; they would be available in towns and in the countryside and link in to the school bus service at ride-sharing car parks.

Train services would provide more opportunities to save money on regular journeys - e.g. special commuter cards.

Throughout we'd provide new services before discouraging 'old' services - e.g. we'd want to ban thermal cars, but only when electric cars have taken off and pool cars are available. We'd like to have more 'pool' electric cars and journeys than private ones. As a country, we'd like to use public statistics on these things to track the success of this programme. There would be subsidies for private operators of buses and pools of electric cars, but they would depend upon passengers actually using them as measured by those statistics.

4. Private sufficiency, public luxury

A key part of a Modern Society is that we have to consume less; we can't all have our own swimming pools and cars. So we invest heavily in excellent public facilities like public parks, cool rooms, libraries, community centers, car pools, public transport, museums and swimming pools. All of those are adequately staffed and protected so that they are a pleasure to use; they aren't all free but the prices have to be very reasonable.

5. Public, progressive and simple taxation system.

Throughout the west, the rich have been getting richer for the last 40 years or so, largely because the state did less for its citizens so that the rich could keep their money. A Modern Society will reverse this pattern; it'll do more for its citizens but in a financially responsible manner. So the wealthy - those that contributed most to climate change - will now be able to make a fairer contribution.

The basic approach is that taxation will be much more progressive, so higher earners will pay more while basic, primary products like food will be tax free. The tax system will also be a lot simpler - all sorts of exceptions and loopholes will be removed. But more than that the tax system will be public; someone can look and see how much tax you paid (not what you earned). Tax fraud is treated much more seriously than today, in terms of detection (hence public visibility of taxation), conviction and punishment.

In more detail (but... treat the numbers with caution), the highest rate of income tax might kick in at or around \$10 million and would be at around 70%. Because wealth inequality is even higher than income equality, wealth will be directly taxed; people with more than \$3m of assets pay 2% of their excess, with forfeiture of undeclared assets. [Land Value Tax](#) would be introduced and generate a high percentage of tax revenue (it would replace local taxes); this tax discourages high rents for tenants and encourages inner city redevelopment. In parallel with LVT, land subsidies (a system that pays owners to just own land today) would be eliminated. Inheritance tax would be made higher for the very wealthy; a billionaire's heirs will only get a fraction of that fortune.

We would introduce an [ecotax on sales](#) that helps the poor by exempting all ecologically sound primary products (e.g. most food, public transport, repairs) from tax - or even subsidizes those products and services. At the same time environmentally dubious products - private planes, high performance cars, SUVs - would be more highly taxed. The ecotax would encourage manufacturers to reduce or eliminate packaging and also to design long lifetime, repairable products.

6. Encourage ecological local food production and selling.

We will retarget agricultural subsidies from big agro-business to small, ecological producers and local resellers. Small farmers are guaranteed a minimum price (e.g. for wheat, fruit, chicken, eggs, cheese, veggies etc) selling to an approved cooperative. Cooperatives sell such products with no packaging, possibly with a delivery service to help working families get the food conveniently; the food is sold at low prices, possibly via a [negative ecotax rating](#) or via a [local currency](#). Farmers are given basic insurance for weather events (e.g. flooding, storms). Investment in water recovery and conservation (e.g. drip irrigation) schemes. Families should be able to eat healthy food much more cheaply than today; it's part of reducing the basic cost of living and helping the economically disadvantaged.

7. Radical programme to encourage equality.

There are many hidden barriers to equality of opportunity and the goal here is to break down as many of them as possible, largely by exposing them. All companies must produce anonymous salary data (e.g. broken down by gender or race) and this data is public - discrimination is much easier to spot and prosecute. Unpaid internships and other systems used to reserve jobs for those from families with money are banned. All top schools (Harvard, I'ENA, Oxford etc) have to publish their admission criteria and also their anonymous historical data (with gender, race, education, legacy and financial contributions); they are liable to lose government support - e.g. charity status - and be sued for discrimination. Modest one time grants allow youngsters to launch their careers (e.g. start a gardening business). University costs reduced or eliminated for economically useful degrees (a progressive tax system makes this economically sensible). Companies have to publish financial information that identifies CEO reward with a possibility of higher taxation when it exceeds a certain average worker reward ratio.

8. Upgrade homes to be carbon neutral.

Give substantial grants and other aids for people to improve insulation and add solar panels with battery, so that electricity bills are almost a thing of the past. Run a radical programme to cool cities - e.g. paint roofs and car-parks white, plant more trees, start farms in towns. Volunteers work in those programmes.

9. No population growth incentives

Most governments actively support population growth by subsidizing families having many children through tax breaks, child allowance, free education etc. This might have made historical sense (e.g. repopulating a country after the second world war), but it makes no sense now. These financial incentives should be eliminated or even reversed after the second child; for example, there is no tax break or child allowance for the third child and 'negative' benefits after a 4th child. Family planning clinics and education should be freely available to the population, with a full set of services, including contraception and abortion.

10. Corporate control, not welfare.

No fossil fuel subsidies. Polluter pays applied to all industries. Companies have to pay their taxes where they receive income; companies that avoid doing so - e.g. high-technology companies - can be fined. Companies that use tactics to inhibit competitors - e.g. aggressive use of patents, buying up start-up competitors - can be fined. Zero hour contracts restricted (e.g. must pay 1 day per week as a minimum). Compensation to those that lose their jobs to automation, because it is likely those individuals will struggle to work again. Companies that don't obey the law can be banned - e.g. no longer able to use the internet to sell their products or services.

Implementing a Modern Society

There are things we have to do in implementing the above action plan.

Make good options available before discouraging bad ones

For example, make good, free (or cheap) public transport available before increasing the cost of fuel.

Implement early but painlessly

For example, implementing a 4 day work-week should be done immediately; it's important to make progress quickly. For those earning more than the minimum wage, they will lose income, so the fifth day might be paid more generously for those people during a transition period.

Where a change will negatively affect people - e.g. eliminating child allowance after the second

child - the change should be phased in over a long period (and maybe not affect any children already born).

Improved spending power for the disadvantaged

Reduced taxation, more energy efficient homes, free (or cheap) public transport and cheaper food should increase the spending power of the lowest 60% of the population in terms of income. For those in the top 10% or so, their income will be reduced. For those in between these limits, the changes should be broadly neutral.

Financially Sustainable

The government finances have to make sense. Running a budget deficit should be an emergency tool of government, especially when you aren't trying to grow the economy. Obviously we are increasing government spending with better public services, better transport, paying the fifth day, subsidising local food production etc; but we are drawing in more taxes from the wealthy and saving money by not paying unemployment benefit and big agricultural subsidies. The government needs to balance these changes with existing services - e.g. the military - in a responsible way.

Metrics and Accountability

The government should publish data and metrics that allow its citizens to see the result of these policies and, where they aren't working, action should be taken. For example, we want to reduce the cost of healthy, local food to families; that can be measured and published. If it isn't working in a specific town, maybe the local food cooperative should lose its subsidy or have its manager changed. Another example might be the availability of pools of electric vehicles to the population; this ought to be high and increasing, and if it isn't - either country wide or in a specific location - action should be taken. Another example is making homes carbon neutral - data on average electricity bills should be available to measure the success of this programme. Progress on improving public transport is another example.

Right now, a country's economy is principally measured by its GDP and the success of the government by its GDP growth. These are completely inappropriate metrics in for a Modern Society. We need to develop new metrics that take into account carbon footprint, sustainability and the cost of living. For example, PPP could be used instead of GDP and then be reduced by a high fictional carbon tax where the personal carbon footprint exceeds 2.5 tonnes of CO₂ per person per year (the limit considered sustainable). Or dividing a country's GDP by a measure of ["how many earths" it needs](#) (if this is over 1); in the case of France in 2018, it would have to divide its GDP by 2.8 This would be a much more reasonable way for a government to report its progress in a Modern Society.

We've already seen that the US government's carbon footprint - i.e. the footprint of all the public services it provides - is so great that, when it is divided over all its citizens, it's impossible for

individual citizens to have a personal carbon footprint that is sustainable. Governments need to measure their own carbon footprint, report on it and make it reasonable.

Living in a Modern Society

Here are some lives in a Modern Society where short term and long term interests are balanced, the rights of future generations are respected and the focus is on people not corporations.

Andrew : 2023

The year is **2023** in a Modern Society. **Andrew** is a 33 year old working for a development company in Chicago. The company specializes in work to reduce warming in the city - to make it more liveable but also to reduce its carbon footprint. Andrew has 3 pictures of Chicago on his office wall; one is a photograph taken from the air 5 years ago. Another is a photograph taken 3 months ago from the same spot; it is noticeably brighter than the first photograph because roofs, car-parks and roads have been painted white (to reflect more sunlight and reduce warming); you can also see more rooftop gardens. The third is a picture of what Chicago should look like in 2030, again from the same spot; it's noticeably greener, with rooftop and urban farms, more trees and new parks. Andrew's company also transforms people's houses to be more energy efficient; adding insulation and window shades is cost effective and subsidized by the government. Andrew's company intends to offer solar panel systems early next year, when a programme of government subsidy is finalized. Much of the work is actually done by volunteers; this really is a local renewal programme.

Mohammed : 2024

The year is **2024** in a Modern Society. **Mohammed** is a 23 year old in France from a disadvantaged suburb of Paris; he still lives with his parents in a council house. He left school without qualifications but has volunteered 4 days a week as a gardener for a council for 4 years now. This gives him a degree of financial independence but more importantly he has learned a trade that he likes; he has found something he is good at. He is hoping to launch himself as a free-lance gardener (an auto-entrepreneur) and is currently getting free advice from a small business counselor; he's learning about his legal obligations, how to build a client base and financial issues. If everything is successful, he will receive a 10,000 euro grant to buy some equipment and a second hand truck. He expects to work in a neighbouring, more wealthy, suburb and will start by putting cards in people's mailboxes to find customers. Life for Mohammed isn't easy, but he does see that he has opportunities that weren't available to his older brother at the same age.

Charles : 2025

The year is **2025** in a Modern Society. **Charles** is the new king of the United Kingdom and is considering how best to respond to the [Land Value Tax](#). The royal family owns a lot of the land

in the country and will be taxed on that land's unimproved value. Some of the land is in the countryside and has relatively low value, but some is in central London, Windsor or Edinburgh and is of high value. Most of the land is owned indirectly in various ways (e.g. via the Crown Estate) rather than directly by the royal family, but the new tax will completely change the monarchy.

The new tax was introduced 3 years ago for most landowners but huge estate holders like the monarchy, the Church of England and the Duke of Westminster were given a 4 year grace period to plan the transition; for many of those big estates there is a double whammy - not only do they have to pay tax but they have also lost subsidies they received as land-owners. The scale of the problem and prospective changes are breathtaking and there are no pain-free solutions for the royal family.

One approach is to sell some of the most significant properties (e.g. Sandringham and/or Balmoral); this would raise some cash **and** reduce the tax bill. Another is for the royal family to generate much higher levels of income from the property it owns; potentially renting out apartments in royal property. Fundamentally, the monarchy will need to get smaller or run itself more like a business. It won't just be Charles' decision, of course, but he wants to participate in formulating a solution.

Ernest : 2026

The year is **2026** in a Modern Society. **Ernest** is a 40 year old investment banker working in the City of London. The last few years have seen many changes for Ernest. Ernest pays more in income tax and he also pays a little bit of the new wealth tax; he is still doing very well but he is definitely worse off financially than he was. When he started working four days a week he decided that living in the country made more sense; from Richmond, he moved to near Gatwick and commutes by train 3 days a week (he telecommutes for the 4th day). Train services have improved in the last few years and while the commute isn't a pleasure, it's much less stressful than driving to work; factoring in the cost of parking, it's also cheaper. The City is now car-free environment, and it's a radically more pleasant place to work; Ernest would never have guessed how much that would improve his quality of life. Another change is that his colleagues are a little less white and male; his bank has to publish compensation information broken down by gender, race and nationality. Right now, the information can't be used to sue the bank for discrimination but that changes in five more years; like lots of workplaces, Ernest's is rapidly becoming more diverse. Ernest understands why these changes were made and is broadly sympathetic to them, though some of his colleagues object to them. He's more relaxed and he really enjoys his extra time off; the improvement in quality of life is probably worth the financial cost.

Jane : 2027

The year is **2027** in a Modern Society. **Jane** is 25 and lives in Sheffield in the UK. She graduated from the local university as an architect; the fairly recent reduction in university fees meant she was able to attend university without taking a loan, though she needed to do some part-time work as a student. She is working for a local firm on a redevelopment on a previously abandoned site in the center of the city; the introduction of the [Land Value Tax](#) has encouraged owners of abandoned sites to sell them for development and for companies to relocate to Sheffield (because land values are lower than in areas like the south-east); the local economy has improved as a result. A year ago she was able to move out of her parents' home and buy a small flat.

Her father was a lorry driver; a difficult, lonely job but one that provided reliably for the family. But he has lost that job to automation; lorries now drive themselves for most of their journeys. For a few months he worked on a zero hour contract to drive the very beginning or the very end of some lorry journeys; the automated driving still has trouble in some awkward spots. But the work only averaged a few hours a week and he decided it was better to move on, so he volunteers as a school bus driver 3 days a week. His income has certainly gone down but he appreciates he has more free time and it feels like a sort of pre-retirement to him. When he lost his job to automation, thanks to recent legislation, he received a small lump-sum from his employer and used part of that money to help Jane with her university fees.

Jane's mother didn't work before but now she also has a zero hours contract where she helps a delivery company when it is busy; she averages 2 days a week but is guaranteed wages one day a week (thanks to recent legislation). She also volunteers at the local library 2 days a week; this keeps her active and gives the family a small amount of extra income. Jane's parents' income has certainly gone down but so has their costs; they gave up their car - because of the free public transport - and buy much of their food cheaply in the local cooperatives; financially they are about even. They feel involved in society and take a lot of pride in Jane's success. You can read about Jane's worse life in today's society [here](#).

Sophie : 2028

The year is **2028** in a Modern Society. **Sophie** is a recently retired teacher in France. She lives alone and has a small but adequate pension which she augments by volunteering as a tutor for 2 days a week. She is glad of the extra income but more importantly it allows her to stay in touch with her ex-colleagues and to feel useful. She uses a local car pool when she needs a car and is glad to avoid the cost and hassle of owning her own car. She visits her daughter by train a lot; it's a long journey and she really appreciates the big discounts she gets with her 100 euro a year savings card. Like most French people, she doesn't have A/C in her house but she recently got a grant to upgrade the insulation in her house and that helps a lot; for Sophie,

summers are hot but bearable. When it's very hot she often spends her afternoons in the local community center, which is air conditioned; she is picked up by a free shuttle the council operates. Sophie does regret that she can't afford to travel more - flights are now pretty expensive - but she sees this as a small price to assure the future for her daughter and grand-children.

John : 2030

The year is **2030** in a Modern Society. **John** has recently become an independent farmer in Iowa. Instead of exclusively growing corn and soy for a big agro-business, he now also grows wheat, beans, hay and oats and he is raising some cows and pigs. He is having to learn a lot of the farming techniques his father used 40 years ago (before the local farms consolidated around agro-business); it's very exciting for him. He now leaves some fields fallow so he can take some water from the aquifer for irrigation; this also makes the soil a little more productive. This diverse agriculture is more work and he is considering taking on a farm-hand. He sells almost all his produce to in-state cooperatives; they are subsidised by the federal government and pay higher prices than agro-business. He also is given very basic crop insurance by the government; this is all part of a program that retargeted the corn subsidies to help small farmers and a more balanced agriculture. Elsewhere in the state, big agro-business are breaking small lots of their mega-farms and selling them to new, independent farmers; again, the effect of retargeting the corn subsidies. After years of population fall in rural Iowa, communities are slowly rebuilding. You can read about John's worse life in today's society [here](#).

Anton : 2034

The year is **2034** in a Modern Society. **Anton** is the head of the World Carbon Bank which is headquartered in Frankfurt. This was set up 10 years ago as an EU initiative with a goal of managing CO2 emissions around the globe. Most countries around the world signed up with the bank because it would allow them to receive compensation from the developed world's CO2 emissions; small, poorer countries generally pollute only a little but suffer more from other country's pollution. The bank sets a [social cost of carbon](#) annually and countries that pollute above their nominal sustainable limit have to pay this cost to the bank on their excess. The US did not join the bank when it was set up but joined 5 years later partly under the pressure of US opinion and partly so it could continue to participate in world trade.

The biggest contributor last year to the bank was China; out of a GDP of \$28 trillion it paid \$1.2 trillion due to its CO2 emissions. The second biggest was the US, with a slightly higher GDP and slightly lower contributions. The contributions the bank receives are divided between compensation and carbon capture projects; at first most of the money went in compensation but now 70% is spent on capture projects. Compensation is divided between all the countries according to how they are affected by climate change; population is considered but low lying

countries like Bangladesh and the Island nations get a higher percentage. The bank invests in carbon capture projects; a lot of them are in China and the US, so their large contributions come back to their economies.

Anton's job is very difficult because every country wants to 'hide' their emissions and to skew the bank's policies in their favor. But the bank has been successful in encouraging countries to cut emissions and in investing heavily in carbon capture projects. There is hope that next year they can drop the social cost of carbon (because the carbon capture projects are working well) and that the CO₂ levels in the atmosphere will start to fall.

Jamel : 2040

The year is **2040** in a Modern Society. **Jamel** is works in a brand new synthetic fuel farm in Morocco. A huge array of solar panels in the desert tracks the sun as it moves across the sky; the generated electricity is used to do two things. First, CO₂ is captured directly from the air; around 30% of this is directly buried below the site and removed permanently from the atmosphere; the World Carbon Bank pays for each tonne of sequestered CO₂. The rest of the electricity is used to split water into hydrogen and oxygen and then combine them with the CO₂ to form a synthetic fuel. The synthetic fuel can be used just like petrol but with two important differences; first, CO₂ released by its combustion was already in the atmosphere prior to its manufacture, so it's a carbon neutral fuel; secondly, its combustion produces no soot or fine particle pollution, it's a clean fuel.

The synthetic fuel is piped out to tankers (themselves powered by the fuel) that take the fuel to France; the same tankers carry fresh water back from France to be used to generate more synthetic fuel. Now thermal or hybrid cars can be built instead of electric ones thus avoiding the heavy batteries (and the pollution associated with their manufacture) and recharging issues. Most new lorries and busses will be powered by this synthetic fuel. Airplane flights have been very expensive for the last 20 years and they should become a lot cheaper as a result of synthetic fuel.

Production of synthetic fuel only took off after two recent inventions; first, a more energy efficient way of electrolysing water; secondly, the development of solar panels which work efficiently at high temperatures (earlier models were less efficient in hotter climes). Morocco has lots of sunlight, it is relatively near France and its ideally situated to manufacture this synthetic fuel for France, so a new Franco-Moroccan company has built this enormous farm. You can read about Jamel's worse life in today's society [here](#).

FAQs

How have politicians contributed to climate change?

Politicians campaign on unemployment, the EU, abortion, gun control, terrorism, migration, the minimum wage and school meals - everything except climate change. The greatest issue facing our planet [is seldom discussed at elections](#); climate change is the elephant in the room. In fact, the very thing politicians are keenest to promise - economic growth - inevitably accelerates climate change. Politicians prefer the simple, optimistic message of economic growth rather than the more complicated one of sustainable development - partly because, until recently, voters haven't been concerned enough about climate change.

Why haven't the public demanded more action?

There are three big reasons.

Disinformation

Corporations want to produce without interference and they want us to consume freely rather than to conserve. Politicians want to get elected with a simple optimistic message and the backing of corporations. Together they successfully foster doubt on sustainability issues; for example, it's only recently that [opinion polls in the US show that the majority believes in climate change as a serious problem](#).

Actions are considered sacrifices

Today, most individual actions to combat climate change are considered sacrifices; e.g. taking the train is less convenient than driving. Until it's easier for citizens to take those positive actions, there will be resistance.

It's a huge but not immediately urgent problem

Climate change isn't urgent in that it can't kill us today; it's easy to put off acting for a little while. The scale of the problem encourages inaction; if you are an optimist you can say "it's Ok, everything will be fine" and do nothing. If you are a pessimist, you might say "it's hopeless, there's nothing we can do". It's easy to use the "if only we had done something 20 years ago" argument.

Why form a Modern Society to tackle climate change?

Imagine that you really need to lose weight for health reasons but you live in a society where that is difficult. Your work canteen sells only things like burgers with fries. Your kids and partner

don't like salads or vegetables and don't want to change their diet at all. The only shops selling tempting vegetables are far away and expensive. You'd like to walk or cycle to work, but the only way of getting there involves driving on a motorway; to get exercise you need to join an expensive health club and it's an inconvenient drive to get there. The only place you can meet socially is a pub. All of this doesn't prevent you losing weight, but it certainly makes it harder; your life-style makes your diet feel like a constant sacrifice.

Trying to tackle climate change today is a bit similar; society is set up around consumption, driving and convenience. There isn't a simple way to buy (or even identify) locally produced, ecologically sound food. Public transport is less convenient and often more expensive than driving. Electric cars are too expensive and there aren't enough recharging points. You can still reduce your carbon footprint, but it's a sacrifice - society isn't helping you.

Expecting everyone to voluntarily make a big sacrifice to tackle climate change isn't going to work. Instead we need to structure society so it's easy and convenient for everyone to reduce their carbon footprint - a Modern Society.

Why don't you simply highly tax bad behavior?

Attempts to tackle climate change simply by taxing bad behavior haven't been very successful.

The first problem is that the cost often falls disproportionately on the poor. Those with a lower income spend a higher proportion of it on primary products like food, electricity or motor fuel. Increasing taxes on those things hurts those that can least afford to bear the cost.

Secondly, it's a hard sell - it makes tackling climate change purely about adding pain. "They want to tax your steak now" is a typical sort of headline. At any sort of election if the choice is between "business as normal" and "business as normal but with added pain" it's not hard to see who will win.

By offering a Modern Society you can enhance many people's lives, change the debate and target who bears most of the cost for tackling climate change.

Would humans vote to tackle climate change?

This would depend entirely on how any question was formulated and how any referendum was conducted. For example, "Do you think we should combat climate change?" would get a more positive response than "Are you willing to pay \$1,000 per month to possibly reduce the effect of climate change on following generations?".

But I don't think this matters very much because a. I believe we are obliged to tackle climate change (see next question) and b. The question is only meaningful in a context - i.e. how you propose to tackle climate change.

Is tackling climate change a moral obligation or a democratic choice?

It's a moral obligation because of the devastating effect of climate change on following generations; democracy doesn't allow future generations to vote. Just as it would be absurd to use democracy to justify a majority enslaving a minority, it would be absurd to use it to 'approve' climate change.

Can we afford to implement a Modern Society?

I don't know but we can't afford to do nothing. We have to tailor the plan to what we can afford; this requires many cycles of defining details and economic calculations.

Would it make people happier?

The ideas presented here are most aligned with the [countries considered the most happy](#).

How would it work in specific countries?

Specific countries have problems layered on top of the things I discuss here; for example, in the USA voter suppression, gerrymandering and big money are killing democracy. So you would probably try to tackle problems like those as part of introducing a Modern Society there.

And the general approach I have outlined would need to be adapted to individual countries. For example, US cities are much more designed around the car and driving than those in Europe, so you would have to take that into account.

Would this work if only one country did it?

Not very well. It might improve economic justice in a single country but climate change is global and all of the polluting countries need to address it (either through the ideas presented here or some other way). If the 4 or 5 biggest polluters (e.g. the US, China, India and Russia) do nothing we are still headed to a Climate Catastrophe no matter what happens elsewhere.

How about trade deals? Don't the ideas here go against them?

Trade deals often put a product built on the other side of the world (with a high carbon transport footprint and low labor costs) up against a local product (with no carbon footprint but higher labor costs). That makes no sense; for example, we want to encourage local food production for environmental reasons. Trade deals will have to adapt to the planet's needs, not the other way

around. Trade deals need to prevent a 'race to the bottom' in terms of carbon footprint, they have to penalize polluters.

Would the wealthy leave rather than pay an increased tax share?

Part of this depends upon where they can go and still avoid paying extra taxes. Someone rich isn't going to move from France or the US to some poor, struggling country to save their tax bill. If they had to pay high levels of taxes in the EU **and** the US, they are unlikely to move anywhere.

What is a critical mass of countries to accept a Modern Society

I firmly believe if the US and the EU adopted a Modern Society or something similar to it (e.g. the [Green New Deal](#)) it would succeed. Other countries would adopt the basic principles in order to keep trading.

How does a Modern Society compare to the [Green New Deal](#)?

They are obviously similar and either would be a huge step forward. I believe a Modern Society has some extra things to promote equality (e.g. salary information is public), has more on taxation (e.g. Wealth Tax, Land Value Tax, ecotax) and not promoting population growth. But the biggest difference is that the Modern Society tries to reduce consumerism (e.g. by working 4 days a week, by highly taxing short lifetime consumer products and by subsidizing local, primary products) whereas the Green New Deal puts more faith in ecologically sound technologies permitting continued growth.

How does managing CO2 emissions help the other crises?

We've seen that individual acts of consumption can contribute to more than one of the 5 Environmental Crisis - climate change, pollution, water scarcity, falling biodiversity and food production.

There's plenty of evidence that [burning fossil fuels leads to air pollution](#); it seems reasonable to assume that manufacturing the fossil fuel (e.g. refining oil, mining coal) and transporting it (e.g. by tanker) leads to other pollution. Climate change is certainly a factor in [water scarcity](#) and [biodiversity loss](#). So there's evidence that reducing CO2 emissions would reduce 4 of the 5 environmental crises.

The fifth environmental crisis is food production, where carbon intensive practices include massive use of fertilizers. [Fertilizer manufacture](#) accounts of 1% of the global carbon footprint, but then (via N2O emissions) it accounts for a further 1.5% in its use and then fertilizer run-off causes [algae blooms - emitters of CO2 and methane](#).

What is Land Value Tax?

This is taxation citizens pay based on the unimproved value of the land they own. For example, the tax on an acre in Central London will be much higher than on an acre in the Highlands; but the tax paid on an acre of industrial waste land in Central London is the same as an acre with a luxury house on it. The tax has several advantages over alternatives; tax-fraud is almost impossible, it encourages redevelopment of waste-land, it redistributes land ownership to more people, it discourages high rents and it encourages development activities in low land value regions. More on [Wikipedia](#).

What is Universal Basic Income?

This is income that the government pays to each of its citizens whether they are working or not. Citizens can use this income as they see fit - e.g. for retraining or simply to augment their income. It is generally accompanied by a simplification of the welfare system - e.g. elimination of unemployment benefit or retraining grants. More on [Wikipedia](#).

What is Wet Bulb Temperature?

This is the temperature an analogue thermometer would read if its bulb was covered in wet cloth; it measures how much cooler the air can get through evaporation. At 100% humidity, no evaporation is possible so the wet bulb temperature equals the air temperature. For a given air temperature, lower humidity means lower wet bulb temperatures. More on [Wikipedia](#).

What is the Social Cost of Carbon?

This is an attempt to work out the cost to the planet of CO₂ emissions. If there was a technology that could easily remove CO₂ from the atmosphere and store it safely, the cost of doing this would be pretty much the social cost of carbon. Because we don't have such a technology - and may never get it - this cost is very hard to work out. [One study works out at \\$417 per tonne](#) and this seems the correct decimal order of magnitude to me; other, much lower numbers, are sometimes used - Obama used \$45 and Trump uses \$1! Because emitters are generally not charged this cost, [it acts as an incentive to pollute](#).

Discouraging pollution by charging the social cost of carbon is good, but, as Vox reports, [there are severe limitations with the idea](#). Even if polluters were always charged an accurate social cost for carbon pollution, there isn't any scheme to actually use this money to 'manage' the pollution. The money would be collected by some government but the pollution is global. So if the money were used as compensation, it would have to be divided up and distributed to every country on the planet using some formula. But, if the money were used to remove the carbon from the atmosphere, then the collecting government would have to undertake (on behalf of the rest of the planet) to actually do the removal when the technology becomes available (if it ever

does). This would need some World Bank of Carbon and implies a much higher level of global cooperation on climate change than exists today.

There is also an interesting comparison you can do between world GDP, world CO2 emissions and the social cost of Carbon. Using 2017 figures, \$2172 of GDP activity generates 1 tonne of CO2. If we actually subtract the social cost of all the carbon emitted from the GDP, this would reduce the world 2017 GDP from \$80.6 trillion to \$65.1 trillion.

What is an Ecotax on Sales?

It's a system to tax the sale of products or services at a rate that reflects their ecological footprint. We want to tax ecologically sound products and services at low rates, especially if they are for primary products like food (because the poor spend more of their income on such products). We also want to highly tax products and services that have high ecological impact; these would include plane flights, bottled water and short life-time consumer products. We want to encourage repairs over replacement, so repair services would be lowly rated and non-repairable products highly rated.

Every product or service would be given a rating from A (ecologically sound - e.g. local unprocessed food, repairs) to E (ecologically unsound - e.g. private planes). This rating would reflect the intended lifetime, repairability and warranty of the product (e.g. a repairable mobile phone with a guaranteed 5 year lifetime would be taxed as a B, but a non repairable one with a 6 month warranty would be a D). The rating takes account of transportation (to encourage local products) and packaging (to encourage simple or no packaging). Products considered as primary (e.g. food, basic clothing, public transport) would get a lower rate than a 'frivolous' products (e.g. a 'whoopee' cushion, a programmable toaster) or 'luxury' products (e.g. fashion, champagne).

The tax on an A rated product would be very low; ideally it would be zero or even slightly negative (that is to say, the government would subsidize good ecological choices). The tax on the highest band would be eye watering - at least 100%. Beef, for example, would be in a higher band than chicken because it has a higher environmental impact.

The rating system is such that it encourages manufacturers to design products with lower ratings - e.g. to package less or make the product more repairable. It's a public part of the buying experience, to educate buyers about the choices they are making. In Europe, this ecotax would be a relatively simple evolution of VAT. In the US, there isn't a nationwide sales tax (though 45 of the 50 states operate sales taxes), so a VAT-like system would have to be introduced.

What is a local currency?

A local currency is used to buy products in a restricted area. If people are paid part of their income in a local currency, they can only use it to buy local products. This automatically has a lower carbon footprint than non-local products and also keeps the money in the local economy. For example, the local food cooperatives could accept local money and the 'fifth day' could be paid half in the national currency and half in the local currency. [Wikipedia has more info.](#)

Appendices

A - Earth Overshoot Day

Earth Overshoot Day is the day of the year when we've used up a year's worth of planetary resources; once we are past that date, we're consuming resources non-renewably. In 2019 we hit that date on the 29th of July; as a general rule, it gets a little bit earlier each year. It's a date calculated for the planet as a whole but you can go to www.footprintcalculator.org and calculate your personal overshoot day.

I did this and got my overshoot day as the 24th of July; for reference the average for France is the 14th of May. I was disappointed because (like everyone else) I consider myself pretty green - I seldom drive or fly, I don't eat much meat - so I decided to see what I could do to change my date. If I installed solar panels and generated 100% of my electricity needs I move the date to the 26th of July - big deal. If I only eat unpackaged, local food, this becomes the 28th of August! If I now go vegan, this suddenly becomes the 15th of October! If I eliminate my 5 hours flying per year this becomes the 21st of November. If I change my small car for an electric one, the date becomes the 7th of December. And if I stop driving (currently 100 Km per week) altogether I actually get through the whole year and arrive at the 21st of Jan 2020. If I want to make any more improvements at this point, I have to move to a smaller house.

Change	Days 'bought'
Install Solar Panels	2
Completely Change Food	80
Buy only local, unpackaged food	33
Go Vegan (from occasional meat)	47
Eliminate Flying (currently 5 hours per year)	36
Get Electric Car (instead of 4 litres / 100 Km)	16
Eliminate Driving (from 100 Km per week)	60

This tells me that I would have to live like a monk to stay within the Earth's resources; it's an effort very few people would be willing to make, myself included. But it does encourage me to get more of my food from local markets and maybe to get an electric car when I need to replace my current car.

Part of the reason that it's hard for me to live within the Earth's resources is that [my footprint includes a fraction of the government's footprint.](#)

B - Factoring in the Social Cost of Carbon

Let's assume we want to plan a return journey from London to Edinburgh, going up on the Friday and coming back on the Monday. We've got 3 choices - to drive, fly or take the train - and the journey is in about 10 day's times, so the cost of the train and flying are reasonable. We do our research in terms of journey times and cost, and choose the most economical direct flight or train. Here's the data I came up with a quick internet search.

	Cost	Time (one way)	CO2	Cost with CO2
Car (small, petrol)	£130 ¹	7 h 25 min	147 Kg	£181
Train	£136	5 h	70 Kg	£150
Flight	£150 ²	4 h ³	202 Kg	£220

The costs aren't very different, but the flight is slightly more expensive. Even allowing for travelling between the city center and the airport, it is slightly faster. It's not obvious which method is best - e.g. my choice might depend on whether having my car in Edinburgh is helpful or a hassle.

I don't need to consider the carbon footprint of my choice because I don't have to pay the cost of my pollution. If I had to pay the [social cost of carbon](#) on top of what I'm charged, then I'm forced to consider my pollution. Using a figure of [£347 per tonne of CO2](#), if this were added to the cost it makes the train clearly the cheapest option and flying clearly the most expensive option.

Now, planes actually pollute by emitting more than CO2; they also emit water vapour and nitrogen oxides at altitude and one study reports that [they 'pollute' more than their CO2 footprint by a factor of 1.9](#). If you factored this in simply, the cost of the flight would be £283; at this point flying doesn't look very likely.

I'm not sure how I would choose in the 'with CO2' and 'without CO2' cases, but adding in the social cost of CO2 certainly increases the chance I'll make a good ecological choice. Enterprises are very sensitive to profit margins and their decisions are likely to be influenced by how pollution is taxed - e.g. whether to generate electricity via renewables or via fossil fuels.

¹ Just for petrol - around 98L. Depreciation, insurance and maintenance are excluded

² Includes 30 pounds from city center to airport and vice versa

³ Includes time from city center to airport and vice versa

C - Emissions, Concentrations and Warming

We are pumping out more greenhouse gases - principally CO₂, methane and nitrous oxide - more quickly than they can be absorbed by the planet. Above this limit, they accumulate in the atmosphere and cause the temperature to rise. We've been doing this with CO₂ since the start of the industrial revolution (around 1800) with ever increasing excesses. The accumulated excesses have risen the CO₂ in the atmosphere from 280 ppm to over 410 ppm over the last 180 years and warmed the planet by a little less than 1C.

The temperature rise associated with higher CO₂ concentrations isn't immediate; if we were to stop emitting CO₂ today, scientists [predict continued warming of around 0.6C over the next 40 years](#).

Although it took 180 years to go from 280 ppm to 410 ppm, the process is accelerating. The first half of that rise took 155 years, but the second half only 25 years. [Every year we pump out more CO₂](#). If we stabilize our CO₂ levels or even cut them by 70% of our current levels, we're still emitting more than the planet can absorb - CO₂ concentrations will continue to rise and temperatures will follow on.

To limit global warming we have to cut the planet's CO₂ emissions to around 50% of what they are today. Even then temperatures will rise (due to the committed warming) for around 40 years before stabilizing.