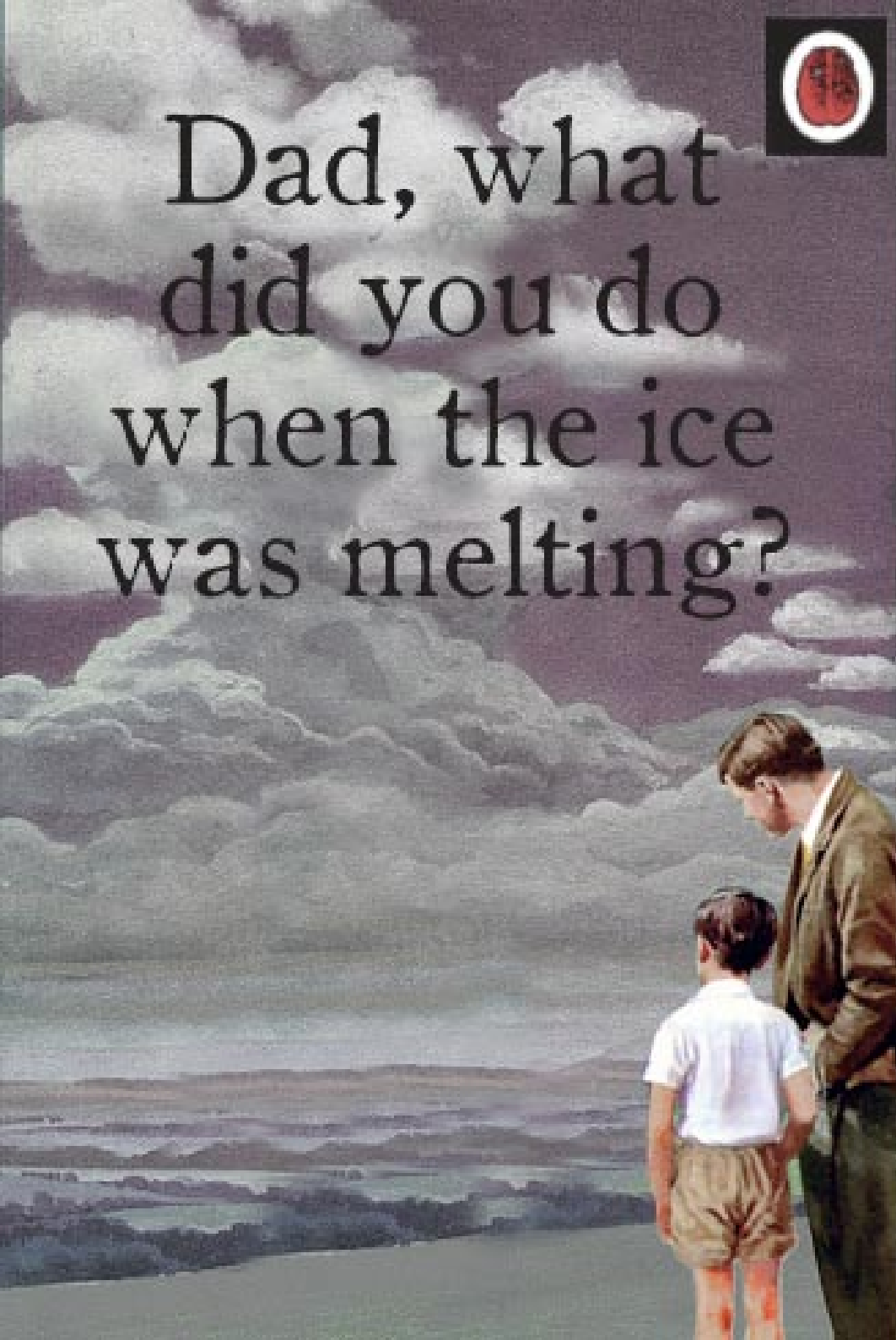




Dad, what
did you do
when the ice
was melting?



**The condensed version of
Climate Change
and a simple way to stop it**

**Written by
Groove Armada's
Andy Cato**

The problems, the sceptics, the science, the negotiations, the solution, the price.

It's not a great feeling being in an airport whilst reading another terrifying article on climate change. I spent a lot of the year doing this, and by the time the gigs calmed down at the end of the summer, the diary was already filling up with touring commitments for the following year, to Europe, to Australia, and to America. Finally, there came a moment when all that airport reading stopped me in my tracks. As I was showing my daughter where these places were on the map, I was struck by an image of her as a young woman in a frightening world. A world of food shortages, refugees, storms, drought and floods. And when she despaired of it all and asked me what had I done as the ice melted, what would I say?

My first thought was to get in touch with a carbon offsetting company who told me that for a flight to Australia and back I had to plant 6 trees at the cost of £17.67. Even to a non-scientist this sounded vague and too easy. What trees, planted where and for how long? There's a big difference between an Amazonian tree and a Norwegian conifer. Who's guaranteeing that either won't get cut down, releasing all the carbon back to where it started? Is it really just a question of flying a bit less, and planting a few trees? I had a sense that things were getting bad but realised I was a long way from the hard facts, timescales and practical solutions. That's why I closed the studio for a while and started looking into the whole question, and this is what I found out.

The Problem

The first thing that struck me was the timescale. Climate change will directly affect us and massively affect our children. What's terrifying about the earth's climate history is how fast things can move, and we're in the middle of rapid change right now. A new eco-shock tourist industry might like to begin visits to the US Glacier National Park, which will be glacier free in ten years time. Glaciers are in massive retreat everywhere. When they disappear, they take the bulk of the world's fresh water supply with them. With water goes agriculture. The UN Environment Program has reported on the catastrophic impact of the melting of the Himalayan and Tibetan glaciers. If we carry on burning fossil fuels as we are, then in 30 years they will be gone. This will mean an end to drinking water for millions of people, and it will also turn off the taps that water half the crops in India and China, the world's biggest producers of food. In the UK we import nearly half of what we eat. In 30 years time we won't be able to do that.

If we carry on as we are then in only 30 years' time average European summers will be like the summer of 2003 which killed 53,000 people and left the European harvest 90 million tons short. A lack of food and drinking water in Africa will mean 60 million refugees heading for Europe alone. Elsewhere the refugee crisis will be worse, with the first sea rises taking half of the world's rice fields with them. Maybe that's why India just built a fence along its border with Bangladesh.

This future will become the present, and is already doing so. 20 of the 25 hottest years on record have occurred since 1980. This is on the back of a 0.75 degree increase in temperature. We've still got another 0.75 to come even if we never take another fossil fuel out of the ground. This is because the sea takes a long time to heat up and so we have yet to experience anything like the temperature rises we have created so far.

Still we keep on adding 23 billion tons of Co₂ to the atmosphere every year, and this amount is rising all the time. The oceans and the land are saturated and are absorbing less and less, with the result that more and more Co₂ contributes to warming up the planet. This means that by 2050 we'll have doubled the amount of Co₂ in the atmosphere, enough to create a temperature rise of 6 degrees, a prospect the UN scientists found so horrific they didn't even want to consider the consequences in detail.

6 million tons of Co₂ a day goes into the oceans, and it is making them acidic. So much so that within 10 years, seawater in the Arctic will start to dissolve the shells of mussels and other shellfish and it will kill all plankton, the

basis of the food chain. The ocean will no longer support marine life. Carry on as we are, and someone born now will be lucky to find any seafood on his or her 18th birthday. Around half of all known species will become extinct in their lifetime.

The Sceptics

It would be nice to believe that this is not happening, and there remain a few people who for their own reasons still try and persuade us that it isn't. Recently there has been controversy over the numbers provided by a climate research team in the UK. Here are some things worth remembering.

1. The evidence for our rapidly changing climate is vast, and in summary was called 'unequivocal' by the International Panel on Climate Change, the United Nations body consisting of the world's top scientists. In fact, there isn't one national or international scientific body in the world that disagrees.

2. We can see the problem accelerating before our eyes. Just this week, scientists from 8 countries released a report which confirmed that the arctic ice has receded 40% further than the worst case scenario of the UN predictions in 2007. Sea level rises during the last 15 years are 80% higher. This is based on observations, not theory. Similarly, we can watch our glaciers disappearing in real time. We can see the permafrost melting.

3. There is no one who disputes that Co2 traps heat in the atmosphere. So given that rising temperatures are already threatening our survival, even for those who take the bizarre view that we're just in a natural cycle, it can't make any sense to keep adding billions of tons of Co2 to this 'natural' effect.

So to those who try and fly in the face of this onrushing crisis and take us all down with them, just use the words of the former American senator Daniel Moynihan. "Everyone is entitled to his own opinion but not his own facts".

We're in our nice sitting room watching the widescreen home cinema, apparently unaware that the roof's already gone up in smoke and the first floor is on its way. We get the odd scent of fire now and again but nothing worth getting off the sofa for. But quite suddenly the smoke will billow through the door and the exits will be blocked.

The basic science behind the problem

Co2 makes up 60% of the greenhouse gas total, which is why global warming is often talked about in terms of Co2. We've known for a long time that the small amount of Co2 in the air is the key to world temperatures. For the last 670,000 years the global temperature has gone up when there is a little more Co2 in the air, and has gone down when there is a bit less. Because of this long temperature-to-Co2 record, we know that if we carry on as we are, then by 2030 we'll have put enough Co2 in the air to make the world around 3 degrees hotter. Measurements from all NASA's satellites and buoys confirm that we are heading this way. Less and less heat that's arriving from the sun is getting out. A 3°C increase doesn't just mean putting on a bit of extra sun cream. The last time the planet was 3°C warmer than now, it submerged coastlines where many millions of people now live, including New York, Shanghai, London. There is only a 5-degree difference between the world as we know it and that in which glaciers and woolly mammoths came down as far as London. If your body temperature goes up 3 degrees, you'll be lucky to be alive. The same applies to the planet.

On the brink. The earth's climate has been pretty extreme in the past. There was ten million years of 'snowball earth', and there have been hothouses where surface temperatures have reached 50C. These wild fluctuations had many causes, but they have one thing in common. A warmer world has more Co2 in it, and every time Co2 levels have gone up, the warming process has started to feedback on itself. As ice melts, its heat reflecting properties are replaced by dark ocean and land that in turn absorbs more heat; 'el nino' events begin to suddenly reverse entire weather systems, and massive stores of greenhouse gases in warming sea beds and the north's frozen wastelands get released to finish the job off. Fast-forward to today when researchers across the permafrost from Canada to Siberia are seeing greenhouse gases bubbling out of melting soil before their eyes. Underneath this icy lid is the same amount again of all the greenhouse gases that we currently have in the atmosphere. If this lid comes off, it's goodnight from us. We need to cool things down and quickly.

Delays and negotiations "Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequence could be second only to a global nuclear war. The Earth's atmosphere is being changed at an unprecedented rate by pollutants resulting from wasteful fossil fuel use ... These changes represent a major threat to international security and are already having harmful consequences over many parts of the globe.... it is imperative to act now."

That wasn't a pre Copenhagen press release. That was from the Changing Atmosphere Conference in Toronto, in 1988. Twenty-one years and 500 billion tons of Co2 later, we are finally trying to sign a treaty at Copenhagen, which would keep temperature rises below two degrees. Not easy, given that we've already put enough Co2 in the air for a 1.5 degree increase, leaving us only 0.5 degrees of leeway at a time when emissions are rising faster than ever. Even this 2-degree target looks incredibly dangerous. Here's an extract from a submission to the Copenhagen delegates:

“Scientists now know with total confidence that any global warming target above 0.8°C is planetary suicide because of events happening in the Arctic, the oceans and coral reefs today at today's warming of 0.78°C”

So maybe they've gone for 2 degrees not because that won't involve massive environmental upheaval, but because it is at least a target we can aim for. Given that this was not aiming very high to start with, it's got worse since. Global leaders acknowledged last July that the 2-degree target would require a reduction of 40 percent in greenhouse gas emissions by 2020, compared with 1990 levels. The Copenhagen proposals would lead to a reduction of ten to 15 percent. Here's how negotiations to agree on that are going, as reported by a UK diplomat to the Guardian newspaper.

“As the talks have progressed, so the negotiators admit to becoming lost in their own verbiage. There have been long debates over whether a comma, a colon or a semicolon should be used in the text; arguments have raged about the meaning of “sustainable forest management” as opposed to “sustainable management of forests”.....Now the talks have invented their own language. There are Bingos who discuss Mrvs, Namas and Napas. I remember my first experience in the negotiations. I concluded after 25 minutes that I was in a madhouse.”

This is not the right response to the urgency expressed by the scientists of the IPCC . “If there is no action before 2012, that's too late. This is the defining moment.”

How we can solve it

There's a good chance we can keep climate change within limits that are manageable. To do that we need to deploy the one natural resource that, thanks to the internet, is more plentiful than ever: human ingenuity. At the beginning of world war two we were flying bi-planes. Within two years, there were spitfire squadrons and radar bases. When the Romans were short on drinking water, they created hundreds of miles of aqueducts, crossing all kinds of terrain, but falling at exactly one inch per mile so the water neither became stagnant nor spilt over the edges at the corners. The pyramids speak for themselves. So humans can solve pretty much any problem that's thrown at them. The problem with this problem is that it won't stop us in our tracks until it's too late. So we need to bring the problem forward and deal with it now.

There are two parts to this. Firstly, we need to use less. Secondly, we need to unleash all the technologies that are ready and waiting to power a carbon free world.

The solution part 1.

Using Less. Why?

We can't win the climate battle without reducing how much we consume otherwise we'll just keep moving the problem somewhere else. Here are a couple of examples.

1. Nuclear Power. Until recently, I'd come round to thinking that this was an important part of the Co2 solution. All its obvious drawbacks seemed preferable to the climate catastrophe that awaits us as things stand. Then I found out that a new generation of British nuclear power will not be as low-carbon as it seemed. The plan is to get all the uranium from a nature reserve in Namibia. As well as flattening the nature reserves and covering it in pools of toxic slurry, the Namibian government plans to build a coal-fired power station to provide electricity for the mines. This will produce more than 10 million tons of annual CO2 emissions. Instead, we could simply employ the best insulation and most efficient light bulbs. This would cut home energy use by ¾ and we wouldn't need any of this uranium in the first place.

2. Biofuels. The world food harvest is at its limit, so when we start putting some of that harvest in our cars, we end up funding the clearing of millions of hectares of rainforest. Because of this, the UN Environment Protection agency

estimates that current biofuels can create upto 2000 times the emissions of fossil fuels. At current levels of consumption, the entire US grain harvest would power less than an eighth of American cars.

Our careless use of energy has reached amazing levels. An average European uses enough energy to keep 60 light bulbs shining for every minute of their life. So setting about powering a family of four from renewable sources currently means finding enough electricity for 240 light bulbs day and night. The UK alone, is burning 81 million barrels of oil, 18.5 million tons of coal and 8 billion cubic meters of natural gas every day.

For a long time we have been consuming the worlds' assets not living off its interest. This has now caught up with us. At the same time, the whole world is trying to live a fossil fuel powered, consumption based existence. There isn't one natural ecosystem being left untapped to try and find everything we need to kit the world out with this lifestyle. But it will never be enough, because the planet cannot sustain it. We would need at least 5 planets' worth of resources to do that. We can't sustain a way of life in which we each throw away 7 tons just of electrical goods, alongside our annual 1.5 tons of general waste.

This manic consumption is an easy problem to solve. We have total control over it. We choose what we use.

Using Less. How?

Here are just a few of the things we can all do straight away

1. If you can afford it, install a rooftop solar water heater. In China where this technology is spreading fast, they are already harnessing the equivalent energy of 49 coal-fired plants. If you live in a block of flats, get together with your neighbours and do it. If it's council housing, insist that they do it.
2. Bottled water has to go. It takes 70 million barrels of oil a year to make the bottles, and that's before you've got the water out of the ground and flown it from Fuji to Fulham. Fill up a reusable bottle before you leave home, or offer newsagents a few pence to refill it if you're on the move.
3. Think before you buy. A plasma screen TV consumes 4 times as much energy as a normal TV. That's not sustainable.
4. Walk, cycle, or take the train. Drive the most efficient car you can afford.

5. Install top grade insulation and the latest fluorescent light bulbs. It will save a fortune in the long run. Go to freeinsulation.co.uk and you can get 70%-100% of the cost paid. If everybody did this we could turn off all of our coal fired stations tomorrow.

6. Dry your washing on a line whenever possible.

7. Recycle everything from your milk bottle to your car. If you haven't got the facilities, demand them from your council. Take steel as an example. Making it uses a lot of energy. It creates 5% of all Co2 emissions. Manufacturing from recycled steel uses only 20% as much energy as making it from scratch. And yet we still throw away enough steel to meet all the requirements of the German car industry.

8. Always buy the best efficiency rated appliances you can afford. If just our fridges managed their energy as efficiently as possible, we could turn off 4 power stations.

9. Only boil as much water as you need and fit a water saving shower head.

10. Wear jumpers and keep your thermostat low.

Some of the big and small things we can campaign for collectively

1. Include the price of recycling an appliance into its purchase cost. When you buy an appliance, you get two prices, purchase and decommissioning, and you can compare products on this basis. When they did this in Japan, their appliances became very easy to recycle very quickly, and none go to landfill sites anymore.
2. Back this up with a landfill tax that charges for the dumping of waste.
3. Require 'best standards' for appliances. This means that as each more energy efficient model comes onto the market, every model has to be as efficient as that. This makes manufactures constantly compete to use less energy and stay ahead of the game. Unleashed worldwide, the effect of these regulations would be huge.
4. The LEED certification system for buildings in the US has shown that architects know how to make buildings use 50% less energy than a standard

construction. It needs to be a requirement that they do it.

- 5 Update the national grid to get ready for the efficient distribution of renewable electricity and financially incentivise the power generators to emit less Co2.
- 6 Ban the sale of non-refillable drinks cartons. They need a lot of energy to be made, then they go in the landfill and create methane.

The solution part 2.

The simple route to clean energy.

We need a tax of £120 per ton on Co2 emissions by 2020. This is a tax that will be paid by the industries and utilities that emit Co2, and by the providers of fossil fuels. This is the price at which the market tells the truth about the actual cost of burning fossil fuels. It's the price at which a unit of electricity from dirty fuels becomes uneconomical compared to the clean alternatives. It's the price at which the brilliant young scientists around the world who are queuing up to solve our energy problem will be able to get funding. Big corporations are ready to invest massively in clean energy but they will not do so while burning dirty fuels is so cheap.

The pricing of fossil fuels is the greatest failure of market forces in human history. As we're already seeing in increased droughts, floods and storms, in our disappearing fresh water supplies or expanding deserts, the current price of fossil fuels is miles away from the actual price to society of burning them. On top of that these fuels are still subsidised to the tune of \$300 billion a year. That's more than 4 times the total EU foreign aid budget. Left to the current market, the first thing that will happen as energy reserves get tight will be the exploitation of all the trickier and dirtier supplies that will become viable. This is already happening in Canada, where the Tar Sands project is extracting oil at such an environmental cost that a Prius running on petrol refined from it will have the same carbon footprint as a Hummer.

A Co2 tax will change all this. The technologies for a Co2 free future are there and we just need to create a market for them.

We created a market for computers that doubled the power of the processors every couple of years. The same can apply to saving civilization the moment we take this simple step.

Carbon Free Energy. Ready and waiting.

The problems might not be our fault, but the solutions are at hand. This means we will be accountable if we choose not to adopt them. Here are just a few of the practical, tried and tested solutions that are waiting for us once we put the correct price tag on fossil fuels.

1. The US and Europe have identified enough offshore wind power to provide for their entire economies. China has identified sites that would give it 1500 times the amount of power it needs. Wind power works on a large scale. China has outlined plans for a wind farm that will provide 30% more power than all UK requirements. You can construct and install a wind turbine in under 2 months. If we used the excess production capacity of the car industry to expand wind power quickly, we could turn off 70% of all coal power stations in less than 10 years. When compared to nuclear power, windpower provides twice as much power for the same cost.
2. On the roads, hydrogen cars are a reality, and if we make the hydrogen from renewable electricity, we'd have silent cars with water as the only byproduct. The electric car with 100-mile range and 80 mph speed exists. An electric car charged on a wind turbine runs at 50p a gallon.
3. Using current solar technology, a gram of silicon in a solar panel will provide as much electricity over its lifetime as a gram of uranium. We only need 1% of the world's deserts linked by high voltage cables to national grids to provide us with all the power we need. Already, there are companies who want to install high voltage cables between African deserts and Europe which could economically supply half of Europe's electricity.
4. We currently see geothermal energy in the same way we used to look at oil and coal. We only take any notice of the bits that bubble up at the surface and make spa baths. In fact, this energy is evenly spread around the world and the amount reachable with our oil drilling expertise is 4000 times our global energy needs. It's also constant, providing the perfect backdrop to wind and solar.
5. By 2030 we could get rid of nearly 10 billion tons of Co2 by reforesting the tropics. That's about 4 times our annual UK emissions. It would cost less than 2/3rds of the amount of money lost by the UK's 1000 richest people in the recession last year, or less than 5% of the amount the US used to prop up ailing banks.

6. Finally, a Co2 tax will deal with coal. It's by far the dirtiest of fuels. It's made almost entirely of carbon, and so releases huge amounts of it when it's burnt. It also releases black carbon, or soot, which is landing on the remaining ice sheets, making them darker, absorbing more heat and massively increasing the rate of melt. In the UK, if we just use less energy we can turn all our coal fired stations off. Elsewhere, a proper carbon price will finally make clear whether the idea of capturing Co2 from coal fired plants and storing it underground is viable. It won't be easy. To store the Co2 coming out of US power stations would require finding space for 30 million barrels of liquid Co2 a day. In China it's twice that. None of this gets round all the other pollutants from mercury to nitrous oxide that coal pours into the atmosphere every year, killing thousands of people.

Is a Co2 tax too expensive?

When the big climate decisions come up, we always end up haggling over the price. It's like arguing over the cost of repairing the brakes as humanity's car speeds towards a cliff top. There won't be much use for the money you've saved once we've gone over the edge. How do you put a price on the end of our civilisation? This is not idle talk, this is the path we are on.

A tax on Co2 emitters might temporarily have the effect of putting 10% on our energy bills while we make the transition to a clean power future. But the future costs of oil, coal and gas far outweigh this. Here are a few numbers on the costs of fossil fuels.

In the US, they spend \$500 billion a year on oil. A lot of this goes to countries that they currently view as their enemies. Countering this requires a large chunk of a military budget that's over \$1000 billion dollars a year.

In the UK we spend £36 billion a year on oil. This means that when the oil price doubles like it did last year, the extra amount we have to spend is the same as the entire government budget for education. And the price of oil will double again because it's running out at twice the rate predicted by the industry in 2007. Continuing reliance on these fuels will require ongoing massive military budgets to protect supply lines, alongside ever increasing prices. Ofgem are predicting gas and electricity prices may rise up to 60% as we compete for foreign gas supplies over the next few years.

Put all this together and here's the upshot. Taxing Co2 emissions at £120 a ton would cost 1/10th of the amount we spend per person a year on fossil fuels and their associated costs. If we implemented this tax we would get,

1. A sustainable future of limitless renewable energy.
2. A transition to clean energy so fast that within a decade we'd be free from fighting over dwindling fossil fuel reserves, the clean air would save 32,000 lives a year, we'd get ahead of the game in new technologies and create thousands of jobs.
3. Shopping and farming would go local as the true cost of Co2 made the oil based fertilizers and food miles on which we now depend obsolete. This locally sourced food would protect us from the world food crisis that climate change will bring within the next 30 years.
4. Heat and power generation would become more local too as industries harnessed landfill methane, or did deals to share the heat from their processes with residential homes.
5. There would be thousands of jobs created in developing countries when, for the first time, reforested land with all the Co2 it can store away became worth more than deforested wastelands.
6. Technology would develop so fast that in ten years we could export cheap and affordable solar power across the developing world. It would bring hope and education to millions, and provide the best chance of putting a lid on the population growth that will otherwise make a sustainable future impossible.

It would be a revolutionary and exciting time to be alive.

End Game

For 99.5% of human history, we were carbon neutral. We can be again. The earth's support systems are declining so fast that our fossil fuel based, throw away economy cannot last much longer. The only option left to us is to change before the consequences become unmanageable. We know the problem beyond all doubt, and we know we can solve it if we want to. So if we don't, then what will we say to our kids when they ask us what we did when the ice was melting?

What can I do?

You can say to your MP that you won't vote for them unless they sign a pledge to put a tax of £120 per ton on Co2 emissions no later than 2020. That would change everything at a stroke. If we're going to keep the planet habitable, then next year is the last chance for us to elect a government focused on solving this problem.

You can do everything possible to use less energy.

You can campaign for the government to enact the other simple changes, some of which are suggested above, that would have such a massive effect on our future. Keep up to date at <http://andycato.tumblr.com>

It's down to us

The solutions are there, just waiting to happen. All we have to do is demand action. If we demand action, right now, then we can stop this catastrophe from unfolding.

Co2 levels have already crossed what the chairman of the IPCC and the NASA chief scientist call 'the bottom line for humanity'. It's a global emergency and we need to declare it. In the face of a different set of massive but surmountable problems, Martin Luther King said this. "History will have to record that the greatest tragedy of this period...was not the strident clamor of the bad people, but the appalling silence of the good people."

We can't afford to be silent anymore. Let's do a simple thing now that will mean we can create a world of expanding forests, decreasing Co2, expanding glaciers and recovering oceans. We can make it happen.

"Never doubt that a small group of concerned citizens can change the world. Indeed it's the only thing that ever has." (Anthropologist Margaret Mead)