

Ten Ways To Save The World

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It has been a really bad week for the climate. Each day brought depressing news as scientists meeting in Copenhagen told us global warming is taking place more rapidly than expected. The seas are rising faster than predicted; the polar ice caps are melting more quickly; and the Amazon rainforest is doomed unless urgent action is taken.

The main solutions are widely agreed. The world needs to forge a much tougher treaty this year to replace the failed Kyoto Protocol. Global emissions of carbon dioxide must be cut by at least half by the middle of the century, much more in industrialised countries. Using energy more efficiently is essential, as is rapidly increasing it from renewable sources. Nuclear power and biofuels are much more controversial, but are likely to be used to some extent. But new, much less familiar solutions are also emerging.

Here are 10 of them.

Sweep away soot

Cutting soot emissions from car exhausts, factories and open fires is probably the fastest way to tackle global warming, and there are calls for a treaty to achieve this. Scientists say the pollutant is the second biggest culprit in climate change after carbon dioxide. Black carbon, which gives soot its colour, has two main effects. It heats the atmosphere by absorbing radiation from the sun and releasing it into the air. And it darkens snow and ice when it falls on them, causing them to reflect less sunlight, heat up and melt – in turn exposing land or water, which also warms rapidly. Reducing emissions is fairly easy, using tried and tested technology. And it has a rapid effect as soot stays only days or weeks in the atmosphere, compared with centuries for carbon dioxide.

Save the ozone

Measures to save the ozone layer have so far been the most effective steps to combat climate change, as many of the chemicals that attack the protective layer in the atmosphere are also global warming gases. A 20-year-old treaty, the Montreal Protocol, has almost phased out their production, coincidentally eliminating the equivalent of 11 billion tons of carbon dioxide a year. This puts to shame the Kyoto Protocol, which aimed to cut emissions by 2 billion tons. Experts want measures to remove the chemicals from equipment such as old fridges, where they acted as coolants, when these are scrapped, saving the equivalent of 20 billion tons of carbon dioxide.

Make connections

Renewable energy is often unreliable: the sun does not always shine, the wind does not blow for ever. But the European Commission and other bodies are drawing up plans to get round this by tapping clean sources and linking them up, so that there will always be enough to meet all Europe's electricity needs. Solar power stations, for example, would be placed in the Sahara, where just a fraction of the desert could provide for the whole continent. Tides would be tapped along Britain's coasts, the world's best place for exploiting this resource. Huge wind farms would be erected in the North Sea, and these would be balanced by hydropower in mountainous areas such as Norway, storing water behind dams and releasing it on calm days. It would all be linked by a continent-wide electricity grid.

Wise up the grid

Barack Obama, David Cameron and Eric Schmidt, the chairman of Google, are all sold on creating a "smart grid", which the Tory leader describes as like moving from "the plain old telephone system to the internet". The present "dumb grid" just delivers electricity from generators to consumers; the smart one would enable them to communicate with each other. So, it can make fridges and washing machines and other appliances use power when it is abundant and cheap, and avoid peak times when it would be much more expensive. Smoothing out demand in this way means that the grid needs fewer power stations, and can accommodate renewable energy more easily. It would also provide a huge boost to a "rooftop revolution", where households generate their own electricity from the sun or the wind and sell what they do not need to the grid.

Rethink cars

Motoring could be revolutionised if cars were marketed like mobile phones – in a manner that would cut carbon dioxide and reduce the cost of driving. Motorists would get subsidised – or possibly even free – electric cars in the same way that customers currently get mobile phone handsets. In return, they would take out a contract for miles, rather than minutes, entitling them to get power either by plugging in to recharging points (at home, in car parks or on the street) or exchanging batteries at filling stations. The idea is the brainchild of a thirty-something former dot-com entrepreneur, Shia Agassi, who believes it would halve motoring costs. It sounds too good to be true, but Israel, Denmark, Hawaii and San Francisco are already starting to put the system in place – and even Gordon Brown has toyed with the idea. But to tackle climate change properly, the electricity has to be provided by renewable sources or nuclear power rather than fossil fuels.

Embrace scum

Slimy scum could prove our saviour, as algae are emerging as one of the most promising and environmentally friendly sources of biofuel. Algae can grow extraordinarily fast, doubling in weight several times a day. They produce at least 15 times as much fuel per hectare as conventional crops like corn or oilseed rape, and do not take up farmland needed to grow food; they can be grown in lakes, the sea or even in the process of cleaning polluted water. Algae take three times their own weight of carbon dioxide from

the air while growing, and the fuel they produce packs much more power for its weight than other biofuels. It is therefore being developed as a potential carbon-neutral way of fuelling aircraft: Air New Zealand has already mixed it with ordinary jet fuel for test flights. Cars have run on pure algae biofuel, and big oil companies are investing in it.

Grow houses

Hemp is the world's second fastest growing plant after bamboo, shooting up four metres in just 14 weeks, rapidly taking carbon from the air. One hectare provides enough hemp to construct a house, if mixed with lime to revive an ancient building material. Limetechnology, the Abingdon-based firm pioneering the practice, calculates that growing it will capture 50 times as much carbon dioxide as would be saved by upgrading a traditional home to modern standards of energy efficiency. Biochar, an ancient technique used by Amazonian Indians to fertilise their land by burying charcoal, has even wider applications. Opponents worry that growing trees for it will take land out of food production, but Craig Sams – the co-founder of Green and Black's chocolate, who is now developing it – believes that just 21/2 per cent of the world's productive land would suffice to get carbon dioxide levels down to those of the pre-industrial age by 2050.

Pay for trees

Felling forests, especially in the tropics, is the second biggest cause of carbon dioxide emissions after burning fossil fuels, accounting for a fifth of the world's total. But people and governments have no incentive to leave them standing when they can make money by selling the timber, or farming the cleared land. Now international negotiators are beginning to work out how the world as a whole could compensate them for setting aside the chainsaw. In practice, of course, the money would end up coming from rich countries. Halving emissions from deforestation is estimated to cost about \$20bn (£14.3bn) a year, but would avoid pollution costing at least five times as much. Similarly, Ecuador is seeking international compensation for refraining from developing a huge oil field lying under a particularly important area of Amazonian rainforest in the north-west of the country.

Reform taxation

Green taxes are beginning to come back into fashion after being eclipsed for years by sophisticated schemes for trading carbon emissions. They would work best as part of an "ecological tax reform", which would reduce taxes on employment – such as income tax and national insurance – at the same time. By shifting the burden from "goods", such as work, to "bads", such as pollution, it becomes cheaper to lay off barrels of oil than to fire people, reducing pollution and increasing employment. The European Union has estimated that this could create at least 2.7 million jobs across the continent, while combating global warming. The Conservatives and Liberal Democrats have both taken up the idea and promised to introduce it if they get into power. But so did Gordon Brown in opposition, and, despite introducing some modest measures in his 1999 Budget, he backed off after the fuel price protests the next year.

Follow a busker

A former busker, Aubrey Meyer, thought up what is increasingly regarded as the long-term solution to global warming – and, through relentless campaigning, he has managed to get his idea adopted as policy by many governments, especially in developing countries. Dubbed "contraction and convergence", it starts from the principle that everyone on Earth is entitled to emit the same amount of carbon dioxide. It then determines the level of emissions low enough to avoid dangerous climate change. The total amount put into the atmosphere worldwide each year must then be made to "contract" until it reaches this point. Simultaneously, the totals of individual countries have to "converge", so that each emits the same amount for every one of its citizens; rich countries would have to reduce their totals very heavily, while some poor countries could actually be able to increase theirs. Most experts agree that it is the fairest framework. Persuading Americans to agree to emit the same amount as Ethiopians is another matter.

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