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Julian Morris

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By Julian Morris

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Rooms 200–205
Third Floor Temple Chambers
Temple Avenue
London EC4Y 0HP
t: +4420 7836 0750
f: +4420 7836 0756
e: info@policynetwork.net
w: www.policynetwork.net

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info@macguru.org.uk

The Civil Society Coalition on Climate Change

The Civil Society Coalition on Climate Change seeks to educate the public about the science and economics of climate change in an impartial manner. It was established as a response to the many biased and alarmist claims about human-induced climate change, which are being used to justify calls for intervention and regulation.

The Coalition comprises of fifty independent civil society organisations who share a commitment to improving public understanding about a range of public policy issues. All are non-profit organizations that are independent of political parties and government.

About the author

Julian Morris is Executive Director of International Policy Network and a Visiting Professor at the University of Buckingham. The author of over 30 publications, including numerous books and peer-reviewed articles, Julian's work focuses on the relationship between institutions and development. Prior to establishing IPN in 2001, Julian was Director of the IEA's Environment and Technology Programme.

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Falsehoods and non-sequiturs abound in discussions of climate change; often they are found together. So, for example, it is frequently asserted that "the science is settled" (a falsehood) and that, *therefore*, "drastic measures are required to avert catastrophe" (a non sequitur). In this paper, I briefly consider the question of what we know about climate change, before moving on to discuss a range of policy options that might be considered in response to what we know.

What do we know about the science of climate change?

The science of climate change is far from settled. Arguably, it will never be settled. If climate is indeed a chaotic system, as it seems to be, then it is unlikely that we will ever be able perfectly to describe all the relationships between different variables in the system. Nor are we likely ever to have sufficiently accurate measurements of those variables at any point in time such that we would be able accurately to forecast far into the future. The best that we can hope for is models that will provide estimates of boundary values for the system. But we are a long way from a model that does this accurately (Green and Armstrong, 2007).

One of the reasons we are so far from having reliable estimates even of boundary values for the climate is that climate science is a relatively young discipline. But it is developing rapidly: hundreds of papers are published every year addressing all aspects of climate, from analysis of Antarctic ice cores, to models of the behaviour of water molecules in the tropopause. In contrast to the claims of consensus, however, there continues to be substantial disagreement on many important aspects of the science of climate change.

In the past few years, there have been major disagreements over many issues, including: (1) The variability of global mean temperature since 1000AD, with some analysts claiming that the recent rise in temperature is unprecedented during that period (Mann, Bradley & Hughes, 1998, 1999), while others have shown that no such conclusion can be drawn: the result is an artefact of poorly constructed statistical modelling techniques (McIntyre and McKitrick, 2003; Wegman, Scott and Said, 2006). (2) The variation in (North Atlantic) hurricane numbers and intensity since about 1900, with some analysts claiming that hurricanes have become more common and more intense (Emanuel, 2005a,b), while others have pointed out that such a result ignores earlier data that show hurricane numbers follow a cycle and do not increase in number as a result of global mean temperature (Goldenberg, 2001; Pielke, 2005; Landsea, 2005; Vecchi and Soden, 2007). (3) The extent to which human-induced warming has and will affect the incidence of vector-borne disease, with some analysts claiming that warming has already caused a rise in malaria (Patz et al. 2002; Epstein, 1998; Haines and Patz, 2004), while others have shown that this is contradicted by the evidence (Dye and Reiter, 2000; Reiter, 2001; Reiter, 2005).

The parameters of current climate 'forecasting' models are derived from moderately accurate data going back just over a century. Graphical representations typically show the relationship between historical temperature data and model outputs. Given that the models are parameterised using the same data against which they are compared, it is not surprising that they achieve a reasonable fit. This is no indication of their ability to forecast the future. To the extent that any model forecasts have been tested (i.e. comparing forecasts to data outside the sample used to parameterise the model), they have performed poorly, with actual temperatures coming in at the very bottom of the range of forecasts, suggesting upward bias in the models. (Lindzen, 2005; Houghton, 2005; Watson et al., 2001).

To complicate matters, such forecasts of future temperatures are necessarily dependant upon accurate forecasts of future emissions of greenhouse gases (GHGs), which are inevitably no more reliable than any other forecast of human behaviour. Anyone familiar with economic forecasts knows just how poor their record is in forecasting even a year ahead, let alone a decade. No serious economist would try to forecast a century ahead because they know that practically all the variables affecting the structure of the economy are likely to change over that period. (It's difficult to imagine what a forecaster might have come up with in 1907 had they attempted to predict the state of the world in 2007, but it is unlikely to have been anything like the world we actually inhabit. Alarmists of the day might have been concerned about the availability of coal and the implications of rising levels of horse dung.)

Furthermore, it is plausible that in the next fifty years various technologies will be developed that will result in dramatic reductions in greenhouse gas emissions as well as cost savings. If so, the relationship between economic growth and emissions will be quite different to that envisaged in the more alarmist IPCC scenarios. (It may be that some additional incentives are necessary to stimulate those developments – about which more later – but it is also plausible that such changes will occur spontaneously.)

Consider some of the new technologies developed during the past half century which, often in combinations not envisaged at the time of their development, have had unimaginable impacts on our lives. A good example is the laser, which turned out to have uses far beyond those originally envisaged when it was developed in the late 1950s. Lasers are now widely used to write and retrieve data on optical disks. In addition, and perhaps more importantly, they are used to transmit data through a worldwide network of fibre-optic cables. In combination with widespread ownership of personal computers, a set of protocols that enable efficient and effective transmission of data (TCP/IP), and programmes that enable user-friendly data transmission, lasers have transformed the way information is transmitted.

In the process, these technologies have substantially reduced the resources required to record and transmit information. Emails save not only on paper but on oil and other resources that are used to cart letters and packages from one place to another. Downloading songs reduces the amount of resources required to deliver music from the producer to the consumer (including the resources embodied in an LP or CD, as well as the resources required to move physical discs from manufacturer to wholesaler to retailer to consumer). Yet data recording, retrieval and transmission were not envisaged as one of the uses for lasers when they were first developed.

Given the likelihood of similar – and similarly unimaginable – combinations of innovations occurring over the course of the next fifty years, it seems the height of arrogance to suggest that we might realistically predict future emissions in any meaningful way. It can fairly be asserted, therefore, that estimates of future global warming are subject to considerable uncertainty.

"Insuring" against global warming

The substantial uncertainty relating to the extent and impact of current and future anthropogenic global warming (AGW) has been interpreted by some as justification for taking urgent action (e.g. Stern, 2007). The argument is made that since we do not know how bad future warming will be, it is worthwhile investing an amount now to prevent harms in the future. Sometimes this is described as an "insurance policy." For most proposed policy responses, this description is inaccurate and misleading.

If we knew that the policy would pay out in the future in response to specific but unforeseen events materialising, the term "insurance" would be correct. If we knew that the policy would substantially reduce the probability of specified harms occurring, or substantially reduce the extent of those harms should they occur, the term would also be correct. However, most climate related policies advocated under the header of "insurance" do neither.

For the most part, advocates of "insurance" against climate change argue simply that the threat of dangerous climate change justifies limiting human emissions of greenhouses gases (GHGs), such as methane and carbon dioxide. Rarely is any effort made to examine the relative merits of alternative policies. When it is, the conclusion is usually swiftly arrived at that the possibility of alternatives such as adaptation or geoengineering must not be used as an excuse not to reduce GHG – or even more specifically CO_2 – emissions.

Given the uncertainty of the relationship between GHG concentrations and climate, it is far from clear that even drastic reductions in GHG emissions will have much impact on the climate. Meanwhile, Lomborg (2001, p. 304) estimates that if the Kyoto Protocol were adhered to strictly by all signatories until 2100, then the warming expected to occur by 2100 under the "business as usual" scenario would instead occur in 2106 -- i.e. a six per cent delay. Notwithstanding the dubious validity of the IPCC's predictions, that does not sound like a very effective insurance policy.

Consider the following analogy. Suppose that we plan to take a trip on a highway with our young daughter. We want to protect our daughter from experiencing a serious head injury during the journey and are offered two ways in which we might achieve that. First, we could put her in a high-backed booster seat and ensure that the seat belt is correctly fitted. Second, we could reduce our speed by six per cent, from 50 to 47 kilometres per hour. Evidence suggests that the booster seat and belt will substantially reduce the likelihood of severe injuries during a crash (Durbin et al, 2003; Arbogast et al 2005). By comparison, the reduction in speed by three kilometres per hour will make little difference to the probability of crashing and practically no difference to the probability of head injury should a crash take place (e.g. Moore et al., 1995; Morrison, 2001). Of course, we could put our daughter in a booster safety seat *and* reduce our speed but the net effect will be little different from simply putting her in the seat.

To those who say to the Lomborgian criticism, "yes, but that's because we're not doing enough to slow emissions of greenhouse gases," here's the rub: The slower you make the car go, the longer it takes to arrive at the journey; and if the journey is worthwhile (which presumably it is), then that may well be a bad thing.

Suppose we are driving our sick daughter to hospital for an urgent operation. The effect of slowing our speed is to increase the likelihood that we arrive too late for the operation and our daughter dies. Now, while reducing our speed by three miles per hour may reduce that possibility less than if we slow the car to a crawl, it nevertheless undeniably increases the overall probability of her dying (the reduction in probability of arriving at the hospital on time far outweighs the minuscule reduction in the probability of crashing). Clearly, reducing the speed of the car to, say, 20 mph will have a substantial impact on the probability that we will arrive on time to save our daughter.

Applying this reasoning to the climate change problem: if we try to reduce emissions of greenhouse gases too dramatically, we'll slow the economy down and that will harm people both directly and indirectly. Meanwhile, if we slow emissions by six per cent or so, we'll have little impact on the likelihood of catastrophe but will still hamper economic growth.

It is said that the people most likely to be affected by climate change are the poor. This is plausible, since the poor are currently most subject to the whims of the climate (drought, flood, heat, cold, storms, and so on) and are less inherently resilient to change. So, if as a result of restricting emissions of GHGs we slow the economy generally, which is likely regardless of the extent of the emissions reduction but is certain for large reductions, we will almost certainly slow down the progress of the poor. In essence, we will condemn them to continued suffering.

Adaptation: insuring against the impacts of climate change

When considering the best policy to address climate change, it seems reasonable to begin by asking what impact climate change is likely to have. The Civil Society Coalition on Climate Change recently commissioned three papers that seek to answer that question. The first (Southgate and Songhen, 2007) looks at the impact on agriculture (and food) and forestry. The second (Reiter, 2007) looks at the impact on human health. The third

(Goklany, 2007) looks at the impact on and of natural disasters.

Douglas Southgate and Brent Songhen (2007) looked at how food production and forestry have changed in the past hundred years and how they might change in the coming century in response to a one to four degree Celsius rise in global mean temperature. After showing that the past hundred years have seen a dramatic rise in productivity in both agriculture and forestry, they conclude that the impact of even a four degree Celsius rise in temperature is unlikely to reduce productivity considerably. The reason is simple: as long as individuals and companies continue to be able to make investments in the development of new technologies, agricultural and forestry productivity will continue to outpace population growth. There may be some changes in the value of land in different parts of the world, but the net effect of climate change is likely to be small compared to the net effect of technological change.

One caveat is worth making, however: there are barriers to adaptation, many (perhaps most) of which come from government intervention of one kind or another. For example, government ownership of land and water lead to perverse, inefficient, and often environmentally less suitable uses of them. When land and water are owned privately, the owners have incentives to put those resources to their highest-valued use; that often means putting in place effective conservation measures, using water efficiently, putting in place fire breaks in forests, and so on. Government regulations on land uses often have a similarly detrimental impact, since they preclude many private sector innovations. Likewise, government subsidies often have perverse consequences, such as encouraging the production of crops unsuitable to the terrain and over-abstraction of water. Southgate and Songhen argue that adaptation will take place most rapidly and at least cost if government gets out of the way.

Paul Reiter (2007) analysed the supposed impacts of climate change on health. He found that, contrary to claims made by Epstein (1998), Patz (2002) and the WHO (2005), rates of malaria have not risen as a result of climate change. Rather, in wealthy countries, malaria rates have declined dramatically as a result of a combination of, *inter alia*, changes in animal husbandry practices (people no longer live close to animals), drainage of swamps (where mosquitoes breed), the use of insecticides and larvicides, and the use of air conditioning. Meanwhile, in poorer countries, malaria rates declined after about 1960, in large part as a result of using DDT and other insecticides, but are now rising again, in large part because of reduced usage of DDT.

Other health impacts are also highly dependent on wealth, with people in richer countries generally being far less susceptible to death as a result of extreme temperatures than people in poor countries (Keatinge, 2004; Rayner and Malone, 1998). Thus, an increase in wealth will by itself likely reduce the rate of mortality from extreme temperatures because people will be better able to afford clean and efficient heating and cooling systems, as well as having greater access to medical facilities. But increased wealth also brings the capacity to invest in other strategic disease-reducing activities, such as more effective preventive measures for vector-borne diseases.

Notwithstanding the importance of enabling wealth generation, there are other measures which if taken now and over the course of the next few decades will dramatically reduce the likelihood that any AGW would cause an increase in mortality. Those measures include expanding programmes that have been demonstrated to reduce the incidence of diseases such as malaria. For example, spraying the inside walls of huts with small quantities of DDT has been shown to reduce malaria without adversely impacting human health or the environment (Attaran et al, 2000; Roberts et al., 2000; WHO, 2006).

Indur Goklany (2007) shows that mortality and mortality rates from weather-related natural disasters have declined dramatically over the past century. The reasons for this are many and varied but include increased wealth, better building materials, and more reliable warning systems. While the economic damage done by such events has risen, the main reason for this is that wealth has increased both in aggregate and on average. Goklany shows that as a proportion of total wealth in the US, the impact of extreme weather events has remained largely constant over the past century.

In sum, if we are concerned about the impact of gradual climate change, then we should focus on policies that can reduce the harms people face today that might be made worse in the future. Creating an environment in which economic development can take place seems in general the best form of insurance, since it will enable people who are currently at the whim of the weather to diversify their economic activities and thereby become more robust in the face of all manner of future challenges.

As Southgate and Songhen point out, reducing government control over land and water resources would enable people better to identify ways of managing those resources in sustainable ways. Removing subsidies and other interventions that incentivise the use of flood plains and other land likely to be at greater risk as a result if climate changes adversely also seems sensible. Meanwhile, specific policies aimed at reducing exposure to various pathogens and other causes of ill-health may be desirable – but for the most part these would take the form of removing perverse interventions and providing an enabling environment for positive interventions to occur.

How should society address the threat of catastrophe?

Adaptation may well be the most cost-effective option for addressing gradual, mostly benign AGW. But what happens if the warming is neither gradual nor benign? Various extreme scenarios have been envisaged, from a climate flip (a sudden switch into an ice age resulting from feedback effects following a substantial rise in temperature), to runaway warming (resulting from the release of methane stores beneath frozen peat bogs, the drying and consequent burning of subtropical rainforests, and other factors). How should humanity address such threats?

First, it is worth bearing in mind that climate change is only one of many potential catastrophes awaiting humanity. Others include an asteroid impact and the eruption of a supervolcano (NASA, 2007; Sparks, Self et al. 2005). Such catastrophic events could end all human life. Potentially, all of humanity's available resources could be diverted to attempts to counter these threats. The problem is that in so doing, nothing would be left to address more mundane problems, such as providing clean water, food and shelter.

Taking a less extreme case, some resources could be set aside to address possible catastrophes. Then there would simply be *fewer* resources available to invest in other activities. Clearly, when making decisions about addressing potential future threats, it is necessary to identify such trade-offs and prioritise our actions accordingly.

In the case of potentially catastrophic but highly uncertain climate change (no probability can be assigned because of the chaotic nature of the climate), it seems reasonable to divert a small proportion of investable resources into measures that could reduce the likelihood of such a catastrophe materialising. But how much and into what measures?

Most policy analysts focus primarily on one "solution": reducing greenhouse gas emissions. But it is not clear that this is the optimal solution. Let's think it through. If rich countries reduce emissions by, say, 5 per cent below 1990 levels – i.e. the Kyoto Protocol commitment but continued indefinitely – this might cost us somewhere between $50 billion and $500 billion a year.[1] Yet, as noted earlier, the impact would be to delay warming by only a few years. Meanwhile, it seems plausible that at some point in the coming century, a dreaded 'tipping point' might still be passed beyond which catastrophe becomes inevitable; the investment in reducing emissions might delay the onset of the catastrophe by a few years but on its own that would seem to have little real merit. In other words, as the Civil Society Report points out "we might end up blowing a trillion dollars and still find ourselves without a planet".

Meanwhile, if governments took more drastic action to hinder emissions -- for example globally cutting emissions to 20 per cent below 1990 levels by 2020 and keeping them there -- the probability of climate catastrophe might be reduced, but only by massively increasingly the likelihood of global economic catastrophe. Indeed, it seems plausible that beyond an economic catastrophe, a global war might result, with those countries seeking to impose carbon constraints fighting with other countries whose populaces refuse to accept such limitations being imposed upon them.

In that light, carbon control *per se* doesn't seem like a very smart solution. Which is why some analysts have been looking for more acceptable alternatives. In particular, geoengineering is now being taken seriously as an alternative way of addressing climate catastrophe, should the threat become concrete (Cicerone, 2006; Barrett, 2008). Specifically, various relatively low-cost options for either sequestering carbon or reducing incoming solar radiation have been suggested. For example, fertilising the oceans with iron chelate or nitrogen might increase production of plankton, which would absorb carbon dioxide (Markels and Barber, 2001; Boyd, 2004). Meanwhile, firing sulphur into the stratosphere or sending mirrors into space could reduce incoming UV radiation (Crutzen, 2006; NAS, 1991, for mirrors).

These proposals are still speculative and the examples are included here only for illustrative purposes – but they give a sense of what might be possible. Geoengineering technologies are still in their infancy. Much work needs to be done to understand better how they would work and what consequences (both beneficial and adverse) they might have.

As to negative impacts, Wigley (2006, p. 452) points out that the natural experiment represented by the eruption of Mount Pinatubo, which reduced global mean temperatures by around 0.5C for over a year, did not "seriously disrupt the climate system," so emitting similar amounts of sulphur artificially should present "minimal climate risks." Certainly, geoengineering seems to offer a plausible solution to the possibility of climate catastrophe in a way that attempting to reduce carbon emissions simply doesn't.

Geoengineering would, however, not be free. Moreover, as with other interventions, it is possible to spend either a great deal or not very much at all. So, how much does it makes sense to spend?

Crutzen (2006) cites estimates putting the cost of placing sufficient sulphur into the stratosphere to prevent further warming at between $25bn and $50bn per annum. Others suggest the figure would be closer to $5 – $10bn (Nordhaus, 1994), while one group suggests costs as low as $1billion (Teller et al., 2003). Even if the cost of preventing catastrophic climate change through geoengineering turns out to be as much as $50bn/year, that still compares very favourably with many estimates of the cost of the – largely ineffective – Kyoto Protocol.

Note, however, that it is not necessary to begin firing sulphur into the stratosphere just yet, since there is little reason to think that we are close to a tipping point. Also, we may discover that shooting sulphur into the stratosphere isn't a very good idea, either because it turns out to have some really bad adverse consequences or because it is more expensive than other options. What does make sense today is to invest in improving our knowledge of the climate system and in developing potential geoengineering systems (Cicerone, 2006). This is similar to the argument for investing in better monitoring of asteroids and in developing technologies that might one day be used to save us from an asteroid impact.

If it is agreed that some investment should be made in geoengineering, both theory and evidence suggest that such development should be carried out by the private sector. This is simply because private parties would have stronger incentives to identify the most cost-effective schemes than would governments.

Consider the analogous case of developing medicines: the private sector has been responsible for developing nearly all the medicines currently in production; by contrast, government investments in the development of medicines have for the most part failed (Morris et al., 2001).

Another important reason for proposing that the development of geoengineering schemes be kept in the private sector – and not directly subsidised – is that by so doing the potential for serious negative consequences is reduced. When government tries to pick winners, it often fails to take into account the negative effects (direct and indirect) of its actions. Perhaps the most spectacular example of this is the diversion – at the behest of the Supreme Soviet – of the rivers running into the Aral Sea. The original reason for the diversion was to irrigate land to grow cotton. This did result in a temporary increase in cotton production, but soon the land became salinified and production stagnated. Meanwhile, the Aral Sea shrank, with much of the delta drying up, devastating local wildlife and fisheries (FAO, 1998).

By contrast, private sector investments tend to be more cautious and carried out with greater concern for the potential negative impacts. This is especially true in countries that have well functioning systems of private property rights, because property owners engaging in experiments may be held liable for the negative consequences of their actions on other property owners (Morris, 2003).

Why would the private sector make such an investment? For some, it may be an act of pure philanthropy. Bill Gates and Warren Buffet have committed tens of billions of dollars to philanthropic ventures focussed on addressing today's most pressing problems. A new generation of entrepreneurs, such as Jeff Skoll (Ebay), Larry Page and Sergey Brin (Google), are investing some of their fortunes in projects relating to climate change. Richard Branson (Virgin), too, has set his philanthropic store by climate change. If these philanthropists really believe climate change poses an existential or at least potentially catastrophic threat to humanity, they might do well to ensure that their portfolio of climate change investments includes a geoengineering component.

But it need not be pure philanthropy. Some schemes might become essentially self-financing – even profitable. For example Michael Markels' proposal to extract carbon dioxide from the atmosphere by fertilising the oceans would potentially increase the amount of fish and other resources (Markels and Barber, 2001). If it were possible to own the rights to the resources thereby produced, some or all of the investment could be recaptured.

Another factor could be the prospect of the issuers of or counterparties to climate-related insurance or bonds utilising geoengineering schemes as a means of mitigating their potential losses. Suppose that a finance company, we'll call it Climate Speculation Inc (CSI), has issued a bond that matures on the occurrence of a catastrophic loss associated with AGW. Now, CSI will have an interest in preventing that bond from maturing, so might invest in the development of geoengineering scheme(s). Even if it doesn't invest in the development of such schemes, it would likely have an interest in utilising them should the prospect of the catastrophic loss become real – so the mere existence of CSI should incentivise private sector investments in geoengineering.

Another reason investors might invest in the development of geoengineering scheme(s) is the prospect that, at some point in the future, government(s) might purchase their scheme.

Which policy?

There is now a pressing demand in rich countries to 'do something' about climate change. Moreover, the policy idea that is most widely discussed is the imposition of caps on emissions of greenhouse gases. This is worrying because there is potential for very substantial harm to be done through the imposition of such caps, while the likelihood of equivalent or greater benefits is small.

The recent meltdown in financial markets shows how harmful intervention can be. Large scale misdirection of resources into home purchases, driven by various US government policies, combined with underpriced money and synthetic capital (created by banks buying securitised mortgages), caused a massive bubble in asset and commodity prices – as too many dollars chased limited resources. As the supply of money slowed, the bubble began to burst, leading to a vicious cycle of declining asset prices and constraints on lending, resulting in a series of failures, first in the finance industry and now increasingly widely.

Some insight into the kinds of damage that might be done as a result of implementing a cap and trade scheme can be gleaned from the attempt to implement the Kyoto Protocol, which sought to impose a very modest cap on industrial country emissions. In Europe, companies were granted permits under the Emissions Trading Scheme (ETS). Certain large companies with relatively low abatement costs were able to sell some of their permits at a profit of hundreds of millions of dollars – at the expense of the smaller companies that were effectively forced to purchase them (Open Europe, 2007). Some companies even chose to stop production, in favour of selling their permits. Other companies have had trouble continuing to produce because of the cost of buying permits.

A few financial companies were also able to arbitrage carbon reduction by buying permits cheaply in China and selling them at huge profit in Europe. It is only a short step from there to the securitisation of permits and their resale in the form of bonds of varying quality … and we are back in the land of the financial meltdown.

A tighter cap could be catastrophic, especially given the likely knock-on effects of trade sanctions and industry-specific initiatives that seem inevitable once the horse trading begins in legislatures.

If governments really feel obliged to 'do something' about climate change, they should as a priority seek to improve the institutions that enable economic growth and adaptation to change. If they seek to address the threat of catastrophic climate change, then they should create an environment in which private parties have stronger incentives to invest in improving our knowledge about geoengineering. This might, for example, entail establishing a prize fund that would pay out upon the successful demonstration of a geoengineering scheme that complied with certain criteria, such as cost effectiveness, an acceptable level of estimated environmental impacts, and so on.

Those governments still hell bent on limiting carbon emissions would be well advised to consider policies other than cap and trade. Improving the incentives to develop lower-carbon technologies would be one way to achieve this – for example, by strengthening intellectual property rights. Even a tax on emissions, whilst undesirable, would be better than a cap and trade scheme.[2]

Summary and conclusions

The relationship between human emissions of greenhouse gases (GHGs) and global warming remains uncertain. Plausibly, increased emissions of GHGs during the 21st century will lead to mild warming – of perhaps one to three degrees Celsius. To the extent that this warming occurs gradually, the best strategy is likely to be adaptation. The appropriate policy response under such circumstances is to reduce barriers to adaptation, such as regulatory restrictions and taxes that inhibit the free flow of information and thereby prevent entrepreneurs from identifying and seeking to fill market niches.

However, there remains a possibility that more catastrophic warming might occur. Given the difficulty and cost of attempting to reduce emissions at a global scale, one strategy to address this remote catastrophic threat is to invest in geoengineering. Such investments would ideally come from the private sector, motivated either by philanthropy or the potential for profit – or some combination of the two.

Notes

1. A huge number of studies looking at the cost of implementing the Kyoto Protocol have been conducted, with estimates ranging widely depending upon the assumptions made. See, inter alia, Energy Information Administration (1998), Fisher (1999), Weyant and Hill (1999). More recently, Lomborg (2007) has suggested that the cost will be in the region of $180 billion/year. All of these cost estimates should carry a health warning since they make (implicit or explicit) assumptions about the technologies that will exist in the coming century. However, these assumptions are in many ways far less heroic than those that underpin forecasts of future climate.
2. A tax can be set at a predictable level, thereby avoiding market manipulation and general gaming of the system that we have seen with the cap and trade scheme in Europe. That is not to say such a tax is desirable per se – it would inevitably cause harm, especially if it is not off-set by reductions in other taxes. The point is just that it would likely be less harmful than a cap and trade scheme.

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http://www.alabamapolicy.org

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