Creating an Earth Atmospheric Trust: A system to control climate change and reduce poverty

DRAFT as of 5/31/07 In review with *Science*

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Many have argued that there is no silver bullet capable of solving the complex and interdependent problems of climate change, sustainability, and economic development. A consensus is emerging, however, that a major culprit at the intersection of these problems is what the Stern Review (1) called the "greatest and widest-ranging market failure ever seen" - the failure of the market to send proper signals about the real costs of greenhouse gas emissions. This is one of a long list of market failures surrounding open-access resources (2-6). The fact that the atmospheric commons is available as a repository for the wastes of greenhouse gas emitters free of charge, while the damages to society and human welfare are major and growing, is a serious problem that must be addressed to solve the problem of climate change.

Analysts have proposed and studied various forms of carbon taxes and cap and trade systems to deal with this problem (7, 8). A few, like the European carbon market, have actually been implemented to some degree. Here, we suggest a general arrangement that has several key features, including an ability to deal fairly with the regressive nature of most carbon taxing systems, to protect the system from political manipulation, and to contribute to the alleviation of global poverty.

The core of this system is the idea of a common asset trust (9, 10). Trusts are widely-used and well-developed legal mechanisms designed to protect and manage assets on behalf of specific beneficiaries (11). Extending this idea to the management and

protection of common-pool resources such as the atmosphere, whose beneficiaries include all people alive today as well as future generations, is a new but straightforward extension of this idea. Since the atmosphere is a *global* commons, the most appropriate scale for an Earth Atmospheric Trust is global. Implementation at the state, national, or regional scale may, however, be necessary and appropriate as initial steps toward a global system.

The general system we propose has 6 basic features together with 4 special features and precautionary measures (see Supporting Online Material for additional discussion of some of these points).

Basic Features

1) *Create a global cap and trade system for all greenhouse gas emissions (*12). Although either a cap and trade system or a tax system could work, we believe a cap and trade system is superior to taxes for this purpose, because the major goal is to cap and reduce the quantity of emissions in a predictable way. Caps set quantity and allow price to vary; taxes set price and allow quantity to vary.
2) *Auction off all emission permits* – and allow trading among permit holders. This is *essential* in order to send the right price signals to emitters.
3) *Gradually reduce the cap to stabilize concentrations of greenhouse gases in the atmosphere at a level equivalent to 450 ppm of carbon dioxide* (or lower) as recommended in the Stern review (Figure 1). The price of permits will probably go up and total revenues will increase as the cap is reduced (13).
4) *Deposit all the revenues into a Atmospheric Trust*, administered by trustees serving long terms and provided with a clear mandate to protect the asset (the climate system and atmosphere) for the benefit of current and future generations.
5) *Return a fraction of the revenues to all people on Earth in the form of an annual per capita payment*. This amount will be insignificant to the rich, and much smaller than their per capita contribution to the fund, but will be enough to be of real benefit to many of the world's poorest members. At the current annual rate of global emissions of 45 Gigatons CO_2 equivalent (Figure 1) and an auction price of $20 - $80/ton (14), the Trust's total annual revenues would be $0.9 to $3.6 Trillion. If half the revenues were returned equally to all 6.3 billion current inhabitants of the Earth, the payment

would amount to $71 - $285/capita/yr. Payments into the fund for the typical US inhabitant producing 20 tons of CO_2 equivalent per yr would be $400 - $1,600. It is likely that the Trust's income would rise as the cap is lowered (13).

6) *Use the remainder of the revenues to enhance and restore the atmospheric asset, to encourage both social and technological innovations, and to run the Trust.* These funds could be used to fund renewable energy projects, research and development on new energy sources, payments for ecosystem services such as carbon sequestration, etc. If half the revenues were used for this purpose, this would amount to $450 - $1,800 Billion/yr initially. Transaction and administrative costs might consume some small fraction of this.

Special features and precautionary measures

1) Do not allow revenues to go into the general fund of any government
2) Appoint trustees based on their understanding of the purposes and details of the trust and dedication to the goals of the Trust, not their political affiliations, geographic origins, or other criteria.
3) Make all operations and transactions of the Atmospheric Trust transparent by posting them in an open access format on the internet.
4) Make trustees accountable for their actions and decisions and subject to removal if they fail to mange the Trust to serve the needs of all the beneficiaries.

No system is perfect. A system designed on these general principles would, however, be capable of achieving a global emission cap capable of keeping CO_2 concentrations at less than 450 ppm. It would be fair, it would be efficient and relatively immune to political manipulation, and it would help to alleviate global poverty. Creating the Earth Atmospheric Trust will require a global political agreement, most likely negotiated under UN auspices. As negotiators focus on the creation of a climate regime for the post-Kyoto period, we hope they will give serious consideration to establishing such a Trust. We encourage those interested in adding their name to a growing list of supporters of this idea to visit http://www.earthinc.org/earth_atmospheric_trust.php

References and Notes

1) Stern review on the economics of climate change, 2006. http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm
2) Ostrom, E. 1990. Governing the commons: the evolution of institutions for collective action. Cambridge University Press, Cambridge, UK
3) Ludwig, D., R. Hilborn, and C. Walters. 1993. Uncertainty, resource exploitation and conservation. *Science* 260:5104
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8) S. Paltsev, J. M. Reilly, H. D. Jacoby, A. C. Gurgel, G.E. Metcalf, A. P. Sokolov and J.F. Holak 2007. Assessment of U.S. Cap-and-Trade Proposals. MIT Joint Program on the Science and Policy of Global Change. Report No. 146. http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf. Based on sophisticated computer models for climate and the US economy, the authors estimated annual potential revenue from auctioning carbon emission permits at $130 to $370 billion by 2015, $250 to $515 billion by 2050. If these revenues were recycled to all U.S. households, the annual distribution would be $1,600 to $4,900 per family of four.
9) Barnes, P. 2003. *Who owns the sky?: our common assets and the future of capitalism*. Island Press, Washington, DC.
10) Barnes, P. 2006. *Capitalism 3.0: a guide to reclaiming the commons*. Berrett-Koehler, New York.

11) Souder J. A. and S. K. Fairfax. 1996. *State Trust Lands: History, Management and Sustainable Use.* Lawrence, KS: University Press of Kansas.

12) For clarity, we present a simple outline of the system we recommend. Multiple and important details are involved in the establishment of any broad-scale policy proposal. In the Supporting On-Line Material we suggest initial ways of making this general system operational by addressing the dynamics of such a system, the delivery mechanisms, the per capita formula, and who purchases the permits at what stage of the carbon production process.

13) The dynamics of price will depend on the interaction of decreasing supply as the cap is decreased and decreasing demand as the price signals and targeted investment cause shifts to less carbon-intensive technologies. More details on this are given in Supporting Online Material.

14) The $20/ton price is what carbon credits were trading for in the European carbon exchange before the price collapse brought on by the issuance of too many free credits. The $80/ton estimate is from the Stern Review (1). We believe the initial auction price will probably be closer to the $80/ton estimate, but offer this range to bracket the possibilities.

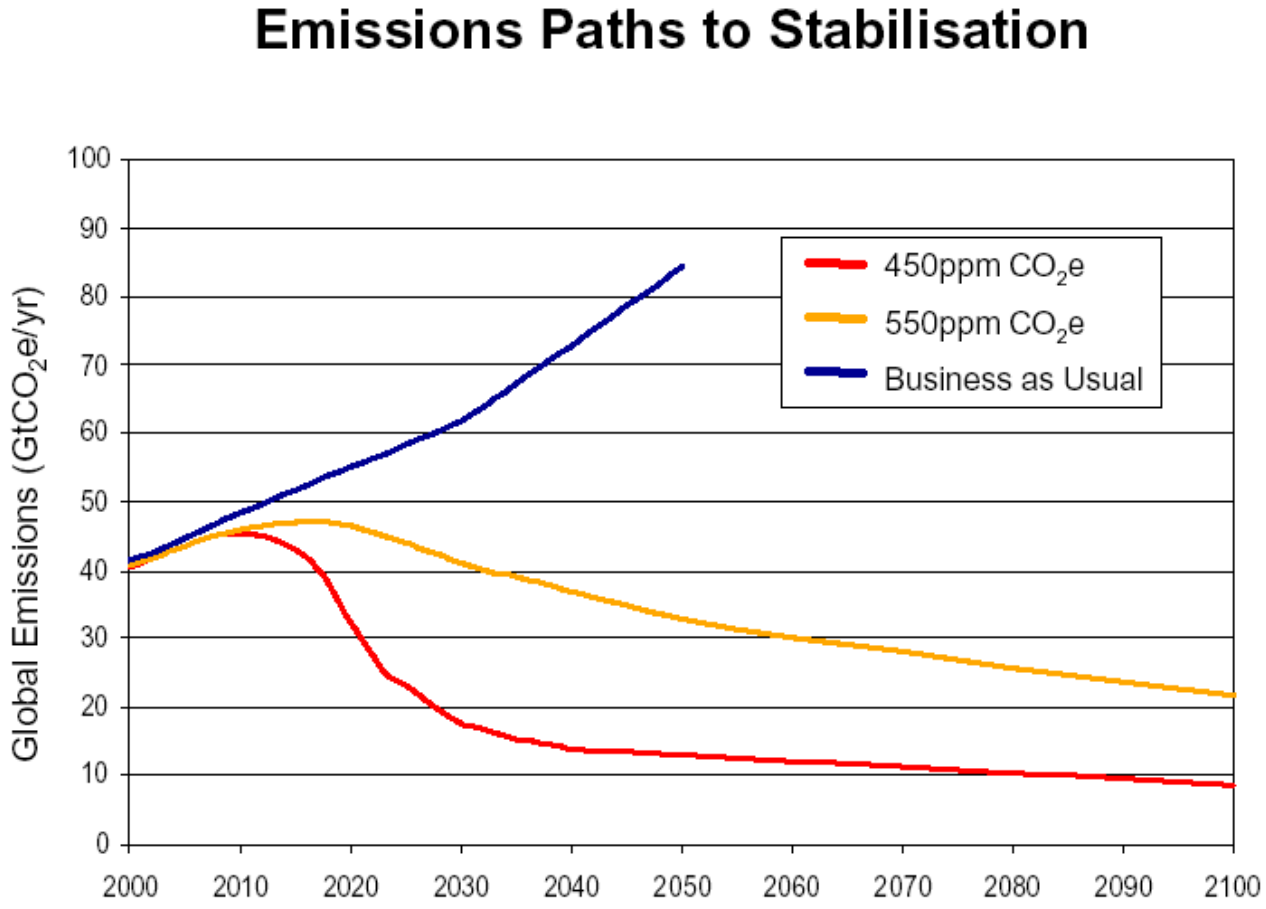

Figure 1. Emission paths necessary to create stable CO_2 concentrations at the specified levels. Source: Stern review on the economics of climate change, 2006. Note that units are Gigatons (billions of tons) CO_2 equivalent per year. Some sources provide emissions data in units of carbon (C) or carbon equivalents (Ce). Emissions reported in CO_2 or CO_2e units are 3.67 times emissions reported in C or Ce units due to the ratio of the mass of C to the mass of CO_2. Also, some sources report only emissions of CO_2 from fossil fuel energy sources, which are about 60% of total emissions, including other greenhouse gases, land use, and agriculture. Thus reported a global emission rate of 7 GtC/yr for fossil fuel burning only would correspond to a rate of approximately (7/.6)*3.67 or 43 $GtCO_2e$/yr.

Supporting Online Material

Many details would need to be worked out in the initial international negotiations as well as over time to make the proposed system operational. Below we briefly identify four of the most important issues and offer our opinions about how they might be resolved.

(1) Dynamics. Detailed modeling would be necessary to work out how permit prices would change over time (c.f. S1), but the general dynamics anticipated after introduction of the system would be something like the following. The initial cap on emissions should be something close to current emissions, and the cap could then follow the trajectory shown in Figure 1 for the 450 ppm scenario. As an educated guess of the initial auction price, we use the $80/ton estimate from the Stern Report (2). As the cap is reduced, two counterbalancing effects will come into play: First, the increasingly limited supply of permits will cause upward pressure on the price of permits; Second, the increasing price of carbon intensive goods and services will cause technological shifts toward less carbon intensive goods and services, an overall lowering of carbon demand, and downward pressure on prices. In addition, the Trust can use part of its revenues for targeted investment in renewable energy and other technologies that reduce greenhouse gas emissions. It is hard to tell which of these forces would predominate. It is likely that prices would increase over time, but not as rapidly as one might expect due to supply constraints alone, due to the counterbalancing effects of induced technological change and targeted investment.

(2) The delivery mechanism. Is there a practical way to distribute, small amount of money to every person on the planet, without going through national governments? Such a mechanism would have to (a) have low transaction costs, (b) be relatively immune to fraud, and (c) have global reach. Ideally it could be done electronically, with people everywhere being able to transfer funds from a global account to a local one. One problem here is that billions of poor people do not have access to banks. One possibility is to allow ‘unbanked’ people to receive their dividends through a micro-credit system. The global fund would work

through entities like the Grameen Bank, and where such entities do not exist, would help start or spread them. In order to receive their dividends, residents would have to join a micro-credit group. All members of the group would pool their dividends to create a loan fund which would supplement the banks', be used for scholarships for local kids, etc. This would yield a double dividend: building community as well as individual wealth.

(3) The per capita formula. A straight per capita distribution formula is the simplest, but it may not be the fairest or even the most appropriate. One possibility is to adjust the per capita distribution formula to account for past emissions. Thus, every person's base dividend, calculated on a per capita basis, would be adjusted by a factor representing his/her country's historic per capita carbon emissions. A U.S. citizen's dividend would then be reduced substantially, while an African's would be multiplied. While this might reduce the appeal of the plan within the U.S., most Americans would probably be willing to forego $40 or so if they knew it was being efficiently used to reduce poverty elsewhere.

(4) Who buys the permits? The simplest approach here is to require permits at the point carbon is introduced to the economy. Fossil fuel producers would have to buy permits for production at all mine-mouths and well-heads equal to the carbon content of the fuels they take out of the ground, and land owners would be required to buy permits for land clearing, burning, or other carbon or other greenhouse gas releasing activities (they may also get credits for sequestering carbon). These agents' cost of buying permits would be passed on to consumers and added to the price of fossil energy and other carbon intensive activities, thereby making non-carbon-intensive activities more attractive and incentivizing rapid shifts toward low carbon alternatives. The big advantage here is simplicity: a relatively small number of agents would have to buy permits and be monitored. While rich countries will always be able to buy more carbon fuel than poor countries (and an emission trading system can't change that), the proposed system would require rich people to pay poor people for the right to emit carbon into the global commons. This transfer would both encourage rich people to use less and allow poor people to get enough.

References and Notes

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