Global warming – are we doing the right thing?

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Pls. Note that this is a first (un-edited) version, with references.

Last month in Bonn, most of the world's nations (minus the US) reached an agreement to cut carbon emissions. Generally, the deal was widely reported as almost saving the world. Yet, not only is this untrue in the scientific sense – the deal will do almost no good – but it is also unclear whether carbon emission cuts are really the best way for the world to ensure progress on its most important areas.

Global warming is important, environmentally, politically and economically. There is no doubt that mankind has influenced and is still increasing atmospheric concentrations of CO₂ and that this will increase temperature. I will not discuss all the scientific uncertainty, but basically accept the models and predictions from the 2001 report of the UN Climate Panel (IPCC). Yet, we will need to separate hyperbole from realities in order to choose our future optimally.

When the IPCC tells us that the world might warm some 5.8°C over the coming century, this is based on an enormous variety of scenarios and models, where the IPCC has explicitly rejected making predictions about the future, and instead gives us "computer-aided storytelling," basing the development of crucial variables on initial choice and depicting normative scenarios "as one would hope they would emerge." Yet the high-end scenarios seem plainly unlikely. Reasonable analysis as we saw yesterday, suggest that renewables – and especially solar power – will be competitive or even outcompete fossil fuels by mid-century, and this means that carbon emissions are much more likely to follow the low emission scenarios, causing a warming of about 2-2.5°C.

Moreover, global warming will not decrease food production, it will probably not increase storminess or the frequency of hurricanes, ["there is no general agreement yet among models concerning future changes in midlatitude storms (intensity and frequency) and variability, if and "there is some evidence that shows only small changes in the frequency of tropical cyclones." it will not increase the impact of malaria or indeed cause more deaths [Mathematical models, merely mapping out suitable temperature zones for mosquitoes show that global warming in the 2080s could increase the number of people *potentially* exposed to malaria by 2-4 percent (260-320 million people of 8 billion at risk.) Yet, the IPCC points out that most of the additionally exposed would come from middle or high income countries, where a well functioning health sector and developed infrastructure makes actual malaria unlikely. Thus, the global study of *actual* malaria transmission shows "remarkably few changes, even under the most extreme scenarios." It is even unlikely that it will cause more flood victims, because a much richer world will protect itself better. [The total cost of protection is fairly low, estimated at 0.1 percent of GDP for most nations, though it might be as high as several percent for small island states.

However, global warming will have serious costs – the total cost is estimated at about \$5 trillion. ¹¹ Such estimates are unavoidably uncertain but derive from models assessing the cost of global warming to a wide variety of societal areas such as agriculture, forestry, fisheries, energy, water supply, infrastructure, hurricane damage, drought damage, coast protection, land loss caused by a rise in sea level, loss of wetlands, forest loss, loss of species, loss of human life, pollution and migration.

The consequences of global warming will hit hardest on the developing countries, whereas the industrialized countries may actually benefit from a warming lower than 2-3°C. ¹² The developing countries are harder hit primarily because they are poor – giving them less adaptive capacity.

Despite our intuition that we naturally need to do something drastic about such a costly global warming, we should not implement a cure that is actually more costly than the original affliction. Here, economic analyses clearly show that it will be far more expensive to cut CO₂ emissions radically, than to pay the costs of adaptation to the increased temperatures.

The Bonn meeting was generally the implementation of the much more studied Kyoto Protocol, which aims to cut carbon emissions to 5.2 percent below 1990-levels in 2010, or a reduction of almost 30 percent, compared to no-intervention.

The effect of Kyoto (and even more so Bonn) on the climate will be minuscule. All models agree that the Kyoto Protocol will have surprisingly little impact. One model by a lead author of the 1996 IPCC report shows us (Figure 1) how an expected temperature increase of 2.1°C in 2100 will be diminished

by the protocol to an increase of 1.9°C. Or to put it more clearly, the temperature that we would have experienced in 2094 we have now postponed to 2100. In essence, the Kyoto Protocol does not negate global warming but merely buys the world six years.

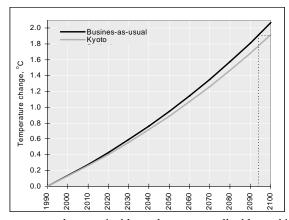


Figure 1 The expected increase in temperature with business-as-usual and with the Kyoto restrictions extended forever. Broken line shows the temperature for the business-as-usual scenario in 2094 is the same as the Kyoto temperature in 2100 (1.92°C). Source: Wigley 1998.

If Kyoto is implemented with anything but global emissions trading – a scheme which

seems utterly unattainable, and was not at all addressed in Bonn – it will not only be almost inconsequential for the climate, but it will also constitute a poor use of resources. The cost of such a Kyoto pact if implemented, just for the US, will be higher than the cost of solving the single most pressing problem for the world – providing the entire world with clean drinking water and sanitation. ¹³ It is estimated that the latter would avoid 2 million deaths every year and prevent half a billion people becoming seriously ill each year. ¹⁴ If no trading mechanism is implemented for Kyoto, the costs could approach \$1 trillion, or almost five times the cost of world-wide water and sanitation coverage. ¹⁵ For comparison, the total global aid today is about \$50 billion annually. ¹⁶

If we were to go even further – as suggested by many – and curb *global* emissions to the 1990 level, the net cost to the world would seriously escalate to about \$4 trillion extra – comparable almost to the cost of global warming itself. ¹⁷ Likewise, a temperature increase limit would cost anywhere from \$3 to \$33 trillion extra. ¹⁸

This emphasizes that we need to be very careful in our willingness to act on global warming. Basically, global warming will be expensive (\$5 trillion) and there is very little good we can do about it. Even if we were to handle global warming optimally which would mean cutting emissions a little fairly far into the future, we can only cut the cost very little (about \$0.3 trillion). However, if we choose to enact Kyoto or even more ambitious programmes, the world will lose. And this conclusion does not just come from the output from a single model. Almost all the major computer models agree that even when chaotic consequences have been taken into consideration "it is striking that the optimal policy involves little emissions reduction below uncontrolled rates until the middle of the [twenty-first] century at the earliest."

So is it not curious, then, that the typical reporting on global warming tells us all the bad things that could happen from CO₂ emissions, but few or none of the bad things that could come from overly zealous regulation of such emissions? Indeed, why is it that global warming is not discussed with an open attitude, carefully attuned to avoid making big and costly mistakes to be paid for by our descendants, but rather with a fervor more fitting for preachers of opposing religions?

This is an indication that the discussion of global warming is not just a question of choosing the optimal economic path for humanity, but has much deeper, political roots as to what kind of future society we would like. This understanding is clearly laid out in the new 2001 IPCC report. Here IPCC tells us that we should build cars and trains with lower top speeds, and extol the qualities of sail ships, biomass (which "has been the renewable resource base for humankind since time immemorial") and bicycles. ²⁰ Likewise, it is suggested that in order to avoid demand for transport, we should obtain a regionalized economy. ²¹

Essentially, what the IPCC suggests – and openly admit – is that we need to change the individual lifestyles, and move away from consumption. ²² We must focus on sharing resources (e.g. through coownership), choosing free time instead of wealth, quality instead of quantity, and "increase freedom while containing consumption." ²³ Because of climate change we have to remodel our world, and find more "appropriate lifestyles." ²⁴

The problem – as seen by the IPCC – is, that "the conditions of public acceptance of such options are not often present at the requisite large scale." Actually, it is even "difficult to convince local actors of the significance of climate change and the need for corrective action." IPCC goes as far as suggesting

that the reason why we are unwilling to accept slower (or no) cars and regionalized economies with bicycles but no international travel, is that we have been indoctrinated by the media, where we see the TV characters as reference points for our own lives, shaping our values and identities.²⁷ Consequently, IPCC finds that the media could also help form the path towards a more sustainable world: "Raising awareness among media professionals of the need for greenhouse gas mitigation and the role of the media in shaping lifestyles and aspirations could be an effective way to encourage a wider cultural shift."²⁸

But of course, while using global warming as a springboard for other wider policy goals is entirely legitimate, such goals should in all honesty be made explicit. Moreover, it is problematic to have an organization which often quite successfully gathers the most relevant scientific information about global warming, also so clearly promoting a political agenda, which seldom reaches the news headlines.

Thus, the important lesson of the global warming debate is fivefold. First, we have to realize what we are arguing about – do we want to handle global warming in the most efficient way or do we want to use global warming as a stepping stone to other political projects? Before we make this clear to ourselves and others, the debate will continue to be muddled. Personally, I believe that in order to think clearly we should try to the utmost to separate issues, not the least because trying to solve all problems at one go may likely result in making bad solutions for all areas. Thus, I try to address just the issue of global warming.

Second, we should not spend vast amounts of money to cut a tiny slice of the global temperature increase when this constitutes a poor use of resources and when we could probably use these funds far more effectively in the developing world. This connection between resource use on global warming and aiding the Third World actually goes much deeper, because the developing world will experience by far the most damage from global warming. Thus, when we spend resources to mitigate global warming we are in fact and to a large extent helping future inhabitants in the developing world. However, if we spend the same money directly in the Third World we would be helping present inhabitants in the developing world, and through them also their descendants. Since the inhabitants of the Third World are likely to be much richer in the future, and since the return on investments in the developing countries is much higher than those on global warming (about 16 percent to 2 percent), the question really boils down to: Do we want to help more well-off inhabitants in the Third World a hundred years from now a little or do we want to help poorer inhabitants in the present Third World *much more?* To give a feel for the size of the problem – the Kyoto Protocol will likely cost at least \$150 billion a year, and possibly much more. UNICEF estimates that just \$70-80 billion a year could give all Third World inhabitants access to the basics like health, education, water and sanitation.²⁹ More important still is the fact that if we could muster such a massive investment in the present-day developing countries this would also give them a much better future position in terms of resources and infrastructure from which to manage a future global warming.

Third, we should realize that the cost of global warming will be substantial – about \$5 trillion. Since cutting back CO_2 emissions quickly turns very costly and easily counterproductive, we should focus more of our effort at finding ways of easing the emission of greenhouse gases over the long run. Partly, this means that we need to invest much more in research and development of solar power, fusion and other likely power sources of the future. Given a current US investment in renewable energy research and development of just \$200 million, a considerable increase would seem a promising investment to achieve a possible conversion to renewable energy towards the latter part of the century. Partly, this also means that we should be much more open towards other techno-fixes (so-called geoengineering). These suggestions range from fertilizing the ocean (making more algae bind carbon when they die and fall to the ocean floor) and putting sulfur particles into the stratosphere (cooling the earth) to capturing CO_2 from fossil fuel use and returning it to storage in geological formations. Again, if one of these approaches could indeed mitigate (part of) CO_2 emissions or global warming, this would be of tremendous value to the world.

Fourth, we ought to have a look at the cost of global warming in relation to the total world economy. Analysis shows that even if we should choose some of the most inefficient programs to cut carbon emissions, the costs will at most defer growth a couple of years in the middle of the century. Global warming is in this respect still a limited and manageable problem.

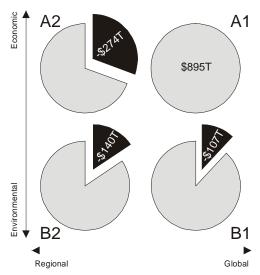


Figure 2 The four main scenarios in IPCC, along the main future directions, Global-Regional and Economic-Environmental. All amounts in trillion 2000 US\$. Source: IPCC 2000b, BEA 2001b-c.

Finally, this also underscores that *global warming* is not anywhere the most important problem in the world. What matters is making the developing countries rich and allowing the citizens of developed countries even greater opportunities. In Figure 2 we see the total income over the coming century as envisaged in the four main scenarios from the new IPCC report. If we choose a world focused on

economic development within a global setting, the total income over the coming century will be some \$900 trillion. However, should we go down a path focusing on the environment, even if we stay within a global setting, humanity will lose some \$107 trillion or 12 percent the total, potential income. And should we choose a more regional approach to solving the problems of the twenty-first century, we would stand to lose \$140-274 trillion or even more than a quarter of the potential income. Moreover, the loss will mainly be to the detriment of the developing countries – switching from A1 to B1 would cost the developing world a quarter of its total income, forgoing a developing per capita income some 75 percent higher. Again, this should be seen in the light of a total cost of global warming at about \$5 trillion and that the optimal global warming policy can save us just \$0.3 trillion.

What this illustrates is that if we want to leave a planet with the most possibilities for our descendants, both in the developing and developed world, it is imperative that we focus primarily on the economy and solving our problems in a global context rather than focusing on the environment in a regionalized context. Basically, this puts the spotlight on securing economic growth, especially in the third world while ensuring a global economy, both tasks which the world has set itself within the framework of the World Trade Organization (WTO). If we succeed here, we could increase world income with \$107-274 trillion, whereas even if we achieve the absolutely most efficient global warming policies, we can increase wealth with just \$0.3 trillion. To put is squarely, what matters to our and our children's future is not primarily decided within the IPCC framework but within the WTO framework.

¹ The IMAGE group, responsible for the B1 marker scenario, de Vries et al. 2000:138.

² The full quote is "Normative scenarios depict situations and conditions as one would hope they would emerge; exploratory scenarios attempt to describe plausible futures by taking into account constraining and counteracting conditions, possibly starting from a normative scenario. In this sense our scenario is largely normative," de Vries et al. 2000:170.

³ Chakravorty et al. 1997.

⁴ See IPCC 1996b:451, Lomborg 2001:288.

⁵ IPCC 2001a:9.3.6.6, continuing "though there are now a number of studies that have looked at such possible changes and some show fewer weak but greater numbers of deeper midlatitude lows, meaning a reduced total number of cyclones."

⁶ IPCC 2001a:9.3.6.6, continuing "though some measures of intensities show increases, and some theoretical and modeling studies suggest that upper limit intensities could increase," which is equivalent to the post-IPCC conclusion that "thermodynamic schemes predict an increase in MPI [maximum potential intensity] of 10%–20% for a doubled CO₂ climate but the known omissions (ocean spray, momentum restriction, and possibly also surface to 300 hPa lapserate changes) all act to reduce these increases," Henderson-Sellers et al. 1998:35.

⁷ IPCC 2001b:9.7.1.1

"Published estimates indicate that increases in global mean temperature would produce net economic losses in many developing countries for all magnitudes of warming studied, and that the losses would be greater in magnitude the higher the level of warming. In many developed countries, net economic gains are projected for global mean temperature increases up to roughly 2°C. Mixed or neutral net effects are projected in developed countries for temperature increases in the approximate range of 2 to 3°C, and net losses for larger temperature increases. The projected distribution of economic impacts is such that it would increase the disparity in well being between developed countries and developing countries, with the disparity growing with higher temperatures. The more damaging impacts estimated for developing countries reflects, in part, their lesser adaptive capacity." IPCC 2001b:Summary for Policymakers, original government draft, 2.6. This quote was later removed in the political approvement process and does not appear in the final *Summary*, but it quite adequately express the background reports, see e.g. IPCC 2001b:TS./.2.4.

¹³ About 1.1 billion people do not have access to clean drinking water today (Annan 2000:5) and the World Bank estimates that it would cost some \$150 per person for water systems, or \$165 billion to provide clean water supplies for everyone (World Bank 1994:11). Equally, about 2.5 billion do not have access to sanitation (Annan 2000:5), and this is estimated to cost less than \$50 per household (World Bank 1994:83), or some \$30 billion (assuming four per household). Thus the total cost of providing full coverage of water and sanitation is less than \$200 billion. The US cost of Kyoto (Annex I trade) is \$325 billion (Nordhaus and Boyer 2000:VIII, 27).

¹⁴ Estimate by USAID and WHO (World Bank 1992:49).

⁸ IPCC 2001b:9.7.1.1.

⁹ Rogers and Randolph 2000, which is cited in IPCC 2001b:9.7.1.1.

¹⁰ IPCC 1998:7.

¹¹ Nordhaus & Boyer 2000:7:25.

¹⁵ Nordhaus & Boyer 2000:8:28.

¹⁶ OECD 2000:270.

¹⁷ Nordhaus & Boyer 2000:7:25.

¹⁸ Nordhaus & Boyer 2000:7:25.

¹⁹ Peck and Teisberg 1992, Maddison 1995:345, Parson and Fisher-Vanden 1997:614.

²⁰ IPCC 2001c:1.4.3.1.

²¹ IPCC 2001c:1.4.3.2.

²² IPCC 2001c:1.4.3.3.

²³ IPCC 2001c:1.4.3.3.

²⁴ IPCC 2001c:1.4.3.3, cp. IPCC 2001c:TS.5.2: "Adoption of more sustainable consumption patterns."

²⁵ IPCC 2001c:1.4.3.

²⁶ IPCC 2001c:1.5.1.2.

²⁷ IPCC 2001c:5.3.8.4.

²⁸ IPCC 2001c:5.3.8.4.

²⁹ UNICEF 2000:37.

³⁰ See NAS 1992; Herzog *et al.* 2000.