

"A must-read for anyone even slightly concerned about our future on this planet." —*Publishers Weekly* (starred review)

The Blueprint for Survival

Contraction and Convergence

The conclusions that can be drawn from parts I and II of this book are that we need to think beyond energy efficiency and renewable energy and toward concepts of sufficiency, of social and institutional reform, and of personal changes that incorporate *much* less energy and lead to *much* lower emissions of greenhouse gases. This chapter describes the only global solution that, in our view, is practicable, equitable, credible, and can be assured of success.

Global, national, and personal solutions are vital because the 80 percent reduction by 2030 target that the authors of this book consider both essential and realistic works only to limit climate change sufficiently if all countries of the world are also engaged in emissions control and have equivalent reduction targets. As chapter 6 showed, the United States has hitherto shuffled its feet on the climate problem, although this does not mean that it cannot take the lead in the future. But, equally vitally, people within the United States must be

engaged in the project—the government cannot do it without its citizens' support. This means devising a national scheme to share out the country's allocation of carbon dioxide emissions. Both global and national approaches are suggested in this and the following chapter, based on political realism and principles of equity and effectiveness.

Climate Change: An Ethical Issue

It is now essential that climate change is seen as an ethical issue complementing the fundamental one of survival. Intergenerational equity must be acknowledged to be at the heart of policy because, as carbon dioxide emissions accumulate in the atmosphere for hundreds of years, much harm has already been caused and our current emissions are accelerating the process. The principle underlying this approach is the same as the ideal of sustainable development, which was expressed in the Brundtland Report of 1987. Our common future, as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs." Equity is key for practical reasons as well. Without equity, transparent in its application, there can be no realistic prospect of public acceptance or political agreement to introduce the measures needed. As it happens, the richest countries that have the greatest capacity to act are the ones that not only have been responsible for historically high levels of emissions but are also currently the most highly polluting. Thus, they are the ones who should and will have to make the greatest changes under an equal-rights framework. In the same way, poor countries, historically having generated a much smaller fraction of emissions, must be given commensurate "devel-

opment space” to provide economic benefits for their people. Luckily, given advances in technology and the prospects for a broader cultural push toward making alternative lifestyle choices, we are virtually guaranteed that their development paths will not blindly follow the disastrous trajectories of their wealthy neighbors. Nevertheless, from an ethical standpoint of providing equal shares, it is essential that they be given corresponding opportunities to those of rich countries to bring their citizens toward prosperity.

What Is Contraction and Convergence?

A global solution requires global agreement. It is widely acknowledged that the Kyoto Protocol, the first international agreement on greenhouse gas reduction, though intended to lead to a succession of treaties, will deliver only modest savings in global emissions even if its targets are met in full. Future treaties will need to involve all countries of the world, not just the developed countries currently committed to reductions under the protocol. This means agreeing on a framework for a global sharing of the finite capacity of the atmosphere to absorb greenhouse gases without serious damage to the climate.

A brilliant, imaginative, and simple means of reaching such an agreement on emission reductions has been put forward. Known as Contraction and Convergence (C&C), it was first proposed by the Global Commons Institute (GCI) in the early 1990s. Recognition of its unique qualities as a framework for combating climate change has grown at an astonishing rate since that date. It is thought by an increasingly influential number of national and international institutions to be the most promising basis for global negotiations.

DESCRIPTION OF ITS CONCEPT

C&C is founded on the fundamental principles that “safe” atmospheric concentrations of carbon dioxide must not be exceeded, and that global governance must be based on justice and fairness. However, this latter requirement has not been included for moral reasons alone; the GCI also claims that it would be essential for getting agreement from developing countries to take part in global emissions reduction. Its phrase “equity is survival” encapsulated the point that there can be no global security unless climate change is restricted to a manageable level, and this cannot be achieved without all countries of the world sharing this common objective.

C&C consists of:

- **Contraction:** an international agreement is reached on how much further the level of carbon dioxide can be allowed to rise before the changes in the climate it produces become totally unacceptable. Once this limit has been agreed, it is possible to work out the rate at which current global emissions must be cut back to ensure that it is not exceeded.
- **Convergence:** global convergence to equal per capita shares of the agreed contraction is phased toward the contraction target by an agreed year.

C&C is a set of principles for reaching agreement. In fact, it simplifies climate negotiations in a remarkable way to just two questions. First, what is the maximum level of carbon dioxide that can be permitted in the atmosphere? Second, by what date should global per capita shares converge to that level? Using C&C does not entail a par-

ticular concentration of carbon dioxide emissions as the safe limit, nor does it set a timescale for reductions.

Determining the safe limit for greenhouse gas concentrations in the earth's atmosphere depends on the sensitivity of the earth's climate to greenhouse gases and the rate at which some of these gases get sequestered in sinks. As noted earlier, according to the Third Assessment Report of the IPCC, an average rise of global temperatures by 2°C (3.6°F) over preindustrial levels is an important threshold beyond which there would be damage to human health, and the earth's ecosystems would be especially dangerous. This requires keeping long-term concentrations of greenhouse gases within 400–450 ppm in carbon dioxide equivalent.

The GCI argues that C&C offers a realistic "framework" to replace the "guesswork" involved in the Kyoto Protocol. The targets in the Kyoto agreement are not based on any reliable understanding of the safe, or at least not-too-dangerous, limits of greenhouse gases in the atmosphere. Rather, the reductions agreed upon were determined by what was considered to be politically possible at the time of the negotiations between the thirty-seven countries involved. By contrast, C&C would use the best current scientific knowledge to set maximum levels of carbon dioxide emissions in the atmosphere, and hence maximum cumulative emissions. While the date of convergence would be subject to agreement, the principle of equal rights for all would remove the potentially endless negotiations that would otherwise occur, with each country making a case that its contribution to global reductions should be modified in light of its special circumstances.

Another critical element of the C&C proposal is that countries have the ability to trade carbon emissions rights. Countries unable to manage within their agreed upon allocations would, subject to veri-

fication and appropriate rules, be able to buy other countries' or regions' unused ones. The lifetime of the allocations would be restricted (to, say, five years) to discourage futures speculation and hoarding. Sales of unused allocations would be likely to generate purchasing power in vendor countries to fund their development in sustainable, zero-emission ways. Developed countries, with high carbon dioxide emissions, would gain a mechanism to mitigate the expensive, premature retirement of their carbon capital stock. They would also benefit from the export markets for renewable technologies that this restructuring would create. At the same time, the application of the C&C proposal would not only have the virtue of making a major contribution to shrinking the gap between rich and poor, both within and between countries, but would strongly encourage the adoption of types of energy with low carbon dioxide emissions.

WHAT WOULD IT LOOK LIKE?

The impact of C&C on the emissions allowances for people from different countries can be seen in the scenario illustrated below (figure 8), in which the limit on carbon dioxide in the atmosphere is set at 450 ppm and convergence is achieved by 2030.

The C&C graph shows how levels of carbon dioxide emissions related to fossil fuels have evolved over time for six blocks of countries: the United States; other OECD countries (which includes all the EU and other European countries, Australia, New Zealand, Japan, and Canada); the remaining countries of the former Soviet Union (FSU); India; China; and the rest of the world. Not surprisingly, most of the historic carbon dioxide emissions prior to 2000 are the responsibility of the developed world. After C&C is intro-

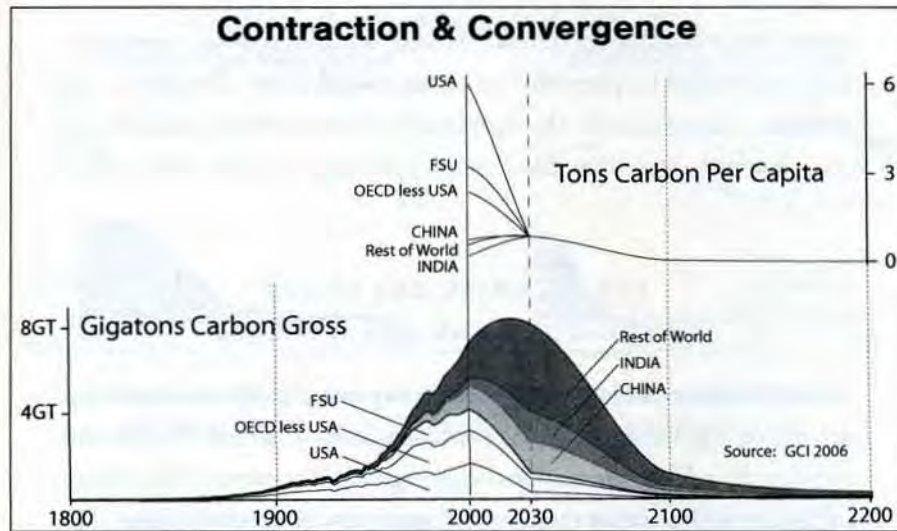


FIGURE 8: Carbon dioxide emissions under C&C (shown gross and per capita) for a maximum of 450 ppm atmospheric concentration achieved by 2100, with "permits" for per capita emissions converging to equality achieved by 2030 (Source: Global Commons Institute, 2006)

duced, for instance in 2000 in this scenario, there is a period of adjustment up to 2030, by which date equal emissions rights have been achieved. The graph assumes that there is no trading between countries; in reality, the pattern of emissions might be rather different from this, with rich countries emitting more, having paid the poorer countries for the privilege of doing so.

The graph shows how per capita emissions of carbon dioxide would change under this C&C scenario. The highest-carbon-emitting countries have to make the largest contributions to the overall reduction in emissions, so the change per capita required is greatest for the United States, followed by the FSU countries and then the OECD

countries (excluding the United States). Emissions from developing countries would be permitted to increase until 2030. Thereafter, the emissions allowances for the developed countries would gradually reduce over time to ensure that the 450 ppm target was not breached.

FUTURE EMISSIONS UNDER CONTRACTION AND CONVERGENCE

As noted earlier, under C&C, the two key issues requiring agreement are the ceiling for atmospheric concentrations of carbon dioxide and the date by which international convergence is achieved. The effects of different choices on these crucial issues are illustrated below.

What is the level at which carbon dioxide should be stabilized? Scientists are increasingly of the view that the only way to avoid dangerous impacts is to limit global average temperatures to 2 degrees Celsius (3.6°F) above pre-industrial levels. There is continued debate about the earth's climate sensitivity, that is to say, the overall responsiveness of the climate to a doubling in pre-industrial greenhouse gas concentrations, which would tell us what 2 degrees Celsius translates into in terms of carbon dioxide concentrations. The prevailing consensus is that we may need to limit carbon dioxide concentrations to as low as 350 parts per million (ppm) if climate sensitivity is as high as many think it could be, or, if we're lucky, to 450 ppm. In what year can the contraction achieve these stabilization concentrations? Again, the consensus is that we must do so by the end of this century.

Figure 9 depicts this for two different pathways (450 ppm and 350 ppm). Although global concentrations of 350 ppm have already been exceeded, it might prove necessary to reduce concentrations back to

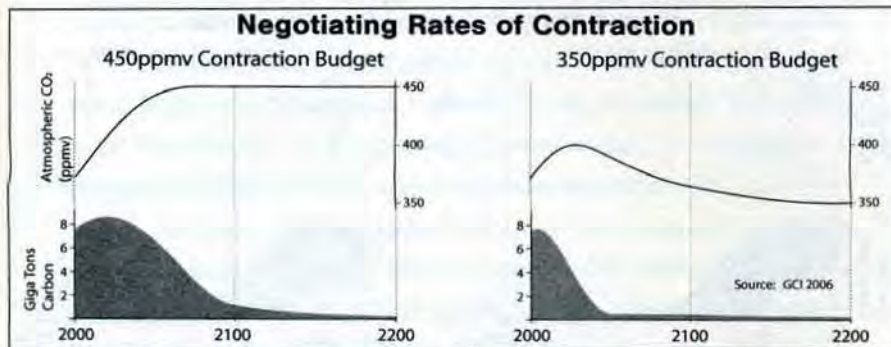


FIGURE 9: Emissions pathways associated with 450 ppmv and 350 ppmv stabilization concentrations (Source: Global Commons Institute, 2006)

this level. In the short term, concentrations would continue to rise, but as the figure shows, if global carbon emissions were reduced to very low levels by around 2050, then atmospheric concentrations could fall to 350 ppm by 2100. Not surprisingly, the remaining carbon budget, that is to say, the degree of freedom we would have to continue to emit greenhouse gases, is much lower in a 350 ppm scenario than in a 450 ppm one. Indeed, annual emissions may also have to be reduced much faster, very significantly by 2050 rather than by 2100, in order to achieve concentrations of 350 ppm.

The second issue to address is how quickly per capita emissions in countries of the developed and developing world should equalize, that is to say, how fast convergence should take place. For a 450 ppm stabilization level, GCI suggests that convergence take place between the years 2020 and 2050, or around a third of the way into a one-hundred-year budget, for example, for convergence to complete. They also stress that negotiations for this at the UNFCCC should occur principally between regions of the world, leaving negotiations be-

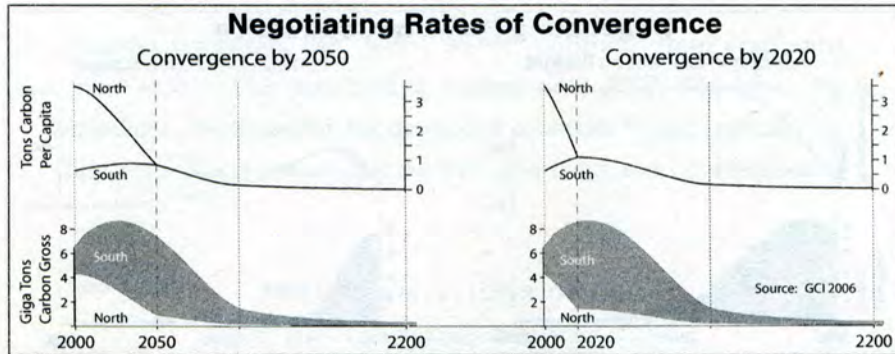


FIGURE 10: Two examples of convergence with a 450 ppm target
(Source: Global Commons Institute, 2006)

tween countries primarily within their respective regions, such as the European Union, the Africa Union, the United States, and so on.

Figure 10 shows how the total carbon budgets and per capita emissions would work out for the developed world—the North—and the developing world—the South—for two different convergence dates. If convergence on a 450 ppm target was reached by 2020, people in the North would have to reduce their per capita emissions very quickly. The earlier convergence date would also mean that countries of the North would be entitled to a lower share of the global carbon budget than if a convergence date of 2050 were agreed.

How Could It Happen?

A framework based on C&C requires international agreement and political consensus. Although the Kyoto Protocol has turned out to be disappointing, there are good precedents for effective global

action on environmental problems. One key example of this is the 1987 Montreal Protocol on reducing substances that deplete the ozone layer, which has been ratified by most countries. The other is the Convention on Long-range Transboundary Air Pollution—designed to abate airborne emissions that cause acid rain, eutrophication, and ground-level ozone—which is supported by forty-nine parties, including the EU. There is no doubt that climate change is a vastly more serious and difficult problem than either of these. Nevertheless, experience shows that, with the will to act, collaboration at the international level on critical environmental issues can succeed.

Recognition of the need for action on climate change should grow steadily as evidence of the damaging consequences of inaction accumulates. Over the years, commentators have suggested that disasters close to home will be necessary before countries act. Sadly, the WHO estimate of 160,000 people dying from global warming each year in developing countries, as cited in chapter 2, does not appear to have alerted world opinion to the need for urgent action. However, following the terrible impact of the 2005 hurricanes in the southern United States, no country can feel confident that it is immune to disasters that seem increasingly likely to be attributable to human-induced climate change. It seems likely that the increasing evidence of the effects of climate change is becoming harder to ignore.

As for the United States, it is clear that it will not come back to the table unless developing countries are included in a future climate regime. Beginning a clear and open debate about C&C is likely to demonstrate to the American public that C&C offers a logical and ethical approach to addressing the climate problem by ensuring collective responsibility. This may help clear the fog of despair among climate activists and others who seem locked into tired positions that

are at least a decade old. It will also give Congress an excuse to revisit climate policy afresh, while remaining loyal to its original position articulated in the Byrd-Hagel Resolution.

Proposed Alternatives

In the course of several of the UNFCCC's Conference of the Parties (COPs), a small but extremely active group of policy analysts has emerged, each with his own approach to developing the global climate regime for the future. In a recent survey, forty-four distinctive proposals were discussed, including C&C. The alternatives vary in terms of their scope and style, with some seeking to extend the basic architecture of the Kyoto Protocol, others proposing policies and measures rather than quantitative emissions targets, and still others proposing a completely new framework. There are proposals that seek to include a subset of countries for negotiation rather than a global process, those that focus only on one or more aspects of negotiation, and ones that attempt to design an entirely new future climate regime.

While it is fruitless for our purposes to compare the entire range of proposals, it is useful to classify them into a few broad groups and to examine a few representative ones. But we should review only those that are relatively simple and unambiguous in their intent to address the climate crisis (as opposed to ones that avoid tackling emissions reductions on the grounds that it would not be "politically feasible"). Three such groups then become evident: burden-sharing based on historical responsibility; various market-based schemes; and so-called Kyoto-plus proposals.

The first is best characterized by the so-called Brazilian proposal,

which was formulated and proposed by the Brazilian Ministry of Science and Technology in 1997 during the negotiations on the Kyoto Protocol. It rests on the principle that the responsibility of each country for inducing climate change be addressed not in terms of causes—that is, the greenhouse gas emissions—but in terms of effects, measured by the contribution of each country for the increase *in the earth's surface mean temperature*. *The proposal is to set differentiated emission-reduction targets for countries according to the impact of their historic emissions on temperature rise.*

Countries with a longer history of industrial development would bear a greater share of responsibility than those with shorter histories. Thus, with its greater share due to earlier industrialization, the United Kingdom would face a 63 percent reduction by 2010 against 1990 levels, while Japan's reduction would be less than 10 percent. This puts all the responsibility for emissions reduction on the older developed countries, excludes developing countries from quantified commitments, and has no formal concentration target. Therefore, the proposal contains an explicit escape clause for some developed countries, notably the United States, which argues that it will not be a signatory of any international agreement on climate change that does not involve a commitment from these other countries.

Market-based schemes typically try to reduce emissions by using some combination of carbon taxes and trading mechanisms. Some propose a carbon cap-and-trade system, in which a global emissions cap is established for each year and countries are allocated (or asked to purchase) "allowances," which they can then trade should they not be in a position to meet their respective "caps." Apart from their tenuous reliance on the market to solve the climate crisis, the main problem with these approaches is that they don't adopt an explicit

framework of fair-burden sharing among countries to reduce greenhouse gas emissions. Without such an ethical notion to guide their strategy, it is likely that rich, powerful countries will negotiate their way to loose caps for themselves and find ways to exploit poor countries by “trading away” their own emissions allowances.

The third set of proposals refers to a variety of initiatives aiming to enhance the Kyoto Protocol’s goals in a subsequent phase in which the world’s largest emitters of carbon dioxide, as well as developing countries and countries with economies in transition, would join the international efforts to cut carbon dioxide emissions. Most of these initiatives recognize the need for developing country participation and some even have specific targets for atmospheric concentrations. The problem with most of them, however, is that they tend to be too cautious about stepping on “political mines” and therefore tend to be too complex and often fail to take a clear ethical position on addressing climate change.

Finally, there has also been some interest in building an equity-based regime that recognizes developing countries’ desire for development, by allowing them to focus primarily on poverty alleviation rather than mitigation. The idea here is that even C&C may not go far enough in providing these countries a fair share of development space, given the relatively short time available for convergence. That is to say, by forcing developing countries to start their mitigation too soon, we may deprive them of a fair chance to address poverty and improve living standards sufficiently. There may, however, be some alternative ways to address this issue within a basic C&C framework by providing them with additional carbon credits in accordance with their share of cumulative historical emissions or by making explicit transfers to assist them with adaptation needs.

A review of proposals for tackling climate change published by a leading U.K. think-tank, the New Economics Foundation, concluded that the GCI's C&C strategy is the only one that offers assurance of, first, arriving at a defined atmospheric concentration; second, the equitable allocations that developing countries have rightly stated are an essential part of any agreement; and, third, the potential for immediate implementation.

The U.S. Position

The United States has not made a formal statement regarding its attitude to C&C as a framework for future climate negotiations. However, U.S. policy statements have consistently insisted that if dangerous climate change is to be averted, a global response involving all nations is required. This was the principle outlined in the Byrd-Hagel Resolution, discussed in the chapter 6. Given this view, C&C at least in theory, should prove attractive to the U.S. government. It too is based on the principle that all countries must be involved in the solution to climate change. Furthermore, it would create a global system of emissions rights which could then be traded between nations—allowing emissions reductions to be made at the lowest possible cost. This is another characteristic of C&C that fits with American statements about the sort of global climate change agreement they could sign up to. Furthermore, despite its unwillingness to take a lead on reducing emissions, as a signatory to the United Nations Framework Convention on Climate Change, the United States is committed to the stabilization of greenhouse gas emissions concentration in the global atmosphere—the

objective of C&C. In summary, none of America's public positions on climate negotiations conflicts in any way with the basic C&C solution, namely achieving equal per capita tradable entitlements for everyone on the planet by an agreed date under a predefined global cap.

International Support for C&C

A large number of national and international bodies have endorsed C&C as the right way to tackle climate change and have published statements supporting it as the framework for negotiations. Since 1997, these have included key government spokesmen in China, India, and the Africa Group of Nations to the UN climate negotiations. It has been endorsed by most European environment ministers and by the overwhelming majority of MPs (elected representatives) in the European Parliament. The All-Party Parliamentary Climate Change Group of MPs in the United Kingdom is promoting C&C. Other organizations lending their support are as diverse as the worldwide membership of the United Nations Environment Program Financial Initiative, and two of the world's largest insurance companies. Numerous non-governmental organizations (NGOs) and academic institutions have also backed it, and the Intergovernmental Panel on Climate Change Third Policy Assessment has acknowledged its logic. The World Council of Churches and other religious organizations have called for a commitment to the framework, and the World Bank has published statements recommending C&C as the basis for effectively and equitably reducing greenhouse gas emissions.

Conclusions

This chapter has detailed the concept of Contraction and Convergence based on the principles of equity and survival on which it is founded. The proposal represents an international framework within which each country then makes its fair contribution to ensuring that a safe climate is maintained. In the judgment of its proponents, including the authors of this book, there is no realistic alternative. Once agreed, its success in reducing emissions is assured because the rates of contraction and convergence are set to that end.

Without doubt, there is an essential need both for public backing and for political leadership in climate negotiations to get all countries "on board." Moreover, all-party consensus is required, as the negotiations will continue to focus on international political agendas for decades, beyond the life of particular administrations. The international support that C&C has gained at political, institutional, and professional levels during the last ten years provides strong grounds for optimism about the prospects of its being "the only way to save the planet."

Chapters 8 and 9 detail how C&C can be implemented within each country by a system of personal carbon allowances allocated annually to its citizens.