Save Kyoto

Stopping climate change will take more than clean-energy investment. We should start by reforming Kyoto, not scrapping it. A response to Michael Shellenberger and Ted Nordhaus.

Ted Nordhaus and Michael Shellenberger are clearly among the "good guys" in the climate debate. They accept that climate change is real and important, and that it requires serious action. But the solutions they propose are inadequate—representing only part of what needs to be a far bigger and more encompassing response to the greatest collective challenge ever to face humanity.

They begin with a convincing (if understated) attack on the Kyoto Protocol as a means of constraining greenhouse gas emissions ["Scrap Kyoto," Issue #9]. As they note, since the agreement was struck in 1997, the Protocol's flexibility mechanisms have created a multi-billion dollar market in a bewildering diversity of carbon-backed securities. But their overall effect may have been to increase, not diminish, emissions. In response, Nordhaus and Shellenberger's would, first, have the world community scrap the Kyoto Protocol and its byzantine flexibility mechanisms. In its place, they write, "The G-8 and other wealthy

OLIVER TICKELL *is a journalist and the author of* Kyoto2.

nations should together invest between $100 billion to $250 billion annually in technology innovation and infrastructure, both in their own countries and in rapidly industrializing nations like China and India."

They are right on both points. The Kyoto Protocol is a poor starting point from which to develop an effective climate agreement. And the world certainly does need enormous investments in researching and deploying clean-energy technologies and infrastructure. According to the International Energy Agency (IEA), government-funded global energy R&D spending is currently about $10.9 billion per year, of which only about $3 billion is spent on clean technologies. This is only 57 percent of the peak level of spending, in 1980, of $19 billion, even though the need for sustainable-energy solutions is far greater now. Meanwhile, multi-trillion dollar energy investments are being made, and planned for coming decades, in fossil-fuel-based infrastructure. China alone is building a one-gigawatt, coal-fired power station per week, with a probable lifetime of 50 to 75 years.

Yet what the authors advocate is not a solution in its own right. It is but one element in a much wider solution that must incorporate adaptation; a globally harmonized regulatory system; effective measures to conserve and sequester biospheric carbon; and a global cap on emissions—in other words, a new and radically improved Kyoto. Without the latter, it is all too possible to have an ever-rising rising proportion of renewables in our energy supply, at the same time as we are burning more and more fossil fuels. Reject the Kyoto Protocol by all means, but the Kyoto process must continue.

Nordhaus and Shellenberger never dispute—and presumably support—the principles of the Climate Convention that birthed the Kyoto Protocol and its core objective, the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." But they appear to believe that this can be delivered by a 500 parts-per-million (ppm) stabilization target for greenhouse gases in the atmosphere and a 90 percent reduction in emissions by 2100; this is, after all, the reduction goal that drives their investment estimates. But this target—representing a near-doubling of pre-industrial emission levels—is seriously inadequate.

There is increasing evidence that even at the present level of 385 ppm, greenhouse gases are setting off positive environmental feedbacks that threaten to render all but the most aggressive emissions reduction targets irrelevant. Take the summer melting of Arctic sea ice. As the ice melts, more sunlight is absorbed by the water rather than reflected back into space, and the Arctic sea warms. A

possible outcome is a runaway Arctic warming process, which in turn will trigger eruptions of methane (a greenhouse gas 70 times more powerful than carbon dioxide over 20 years) from Siberian and Canadian permafrost. The warmer Arctic climate could lead in turn to the accelerated melting of the Greenland ice sheet—and if that collapses, global sea levels will rise by a catastrophic seven meters. We don't know how long that might take, but it now seems that earlier IPCC estimates of a multi-century timescale could be seriously overly optimistic. Elsewhere in the world, rising temperatures threaten to turn the Amazon into a tinder-box and reduce the ability of other forests, and the oceans, to absorb carbon dioxide from the atmosphere. And that is at present levels; if we stabilized at 500 ppm, think of how much worse things would be.

In short, Nordhaus and Shellenberger, for all their talk about belt-tightening, are significantly underselling the challenge. The celebrated if controversial climate scientist James Hansen now proposes an intermediate target of 350 ppm (taken up as a global campaign platform by the recently formed group 350.org), and he expects that we may have to aim for even 300 ppm to achieve longer-term climate stability.

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As Andrew Weaver, a professor at the School of Earth and Ocean Sciences in Victoria, British Columbia, demonstrated in 2007, even if emissions are stabilized at 90 percent below present levels by 2050, the 2 degrees Celsius threshold (widely if erroneously supposed to represent a safe level of warming) would eventually be broken. Only global carbon neutrality by 2050, Weaver concludes, can do the job. That won't be achieved with Nordhaus and Shellenberger's numbers, and it won't be achieved by clean-tech investment alone.

We need to act on all fronts. Above all, we must stop the loss of biospheric carbon, currently responsible for about a quarter of total emissions, and increase the biosphere's capacity to act as a carbon sink. That means, for one, working aggressively to conserve our forests and other ecosystems (both for the sake of the carbon they embody and the wider climate services they perform), and maintain carbon in soils, most especially in peatlands. This will involve, along the way, an agricultural revolution as new low-emission, high-absorption agricultural techniques are developed and put into action. Fortunately, this will also raise productivity—essential as human populations increase—as enriching soils with carbon (whether humus or charcoal) also increases their capacity to retain water and nutrients. But we must invest on a large scale to bring about these changes.

We also need to finance adaptation to the climate change to which we are already committed. As seas rise, as weather becomes more extreme, and as glaciers that supply water to hundreds of millions of people melt away, this will cost hundreds of billions of dollars per year. There are some monies available already, but the world's existing adaptation funds (created under the Kyoto Protocol) are cash-starved, and the few tens of millions of dollars they contain are insufficient to address the needs of a single Pacific island state. If we fail to provide the necessary finance, hundreds of millions of people could die in floods, storms, and droughts, while many more now surviving on the margins of decency will be pushed into destitution.

Nordhaus and Shellenberger argue that we should "abandon the church of Kyoto," in favor of technology spending by the G8 countries and the emergence of regional carbon markets. But the actions of individual governments and an ad hoc assemblage of regional and national caps do not add up to what we need: a global response to a global problem, with a global emissions cap at its core. The authors' faith that diverse carbon markets will somehow coalesce into a globally capped carbon market would be all very well if, to borrow a line from Andrew Marvell, "had we but world enough, and time."

But we do not, and as the poet continued, "at my back I always hear Time's winged chariot hurrying near." Or, as the IEA puts it, "The primary scarcity facing the planet is not of natural resources nor money, but time." It will take decades for such a variety of markets to coalesce: Different carbon markets trade in different kinds of securities. The EU-ETS system works with allowances to emit, while Kyoto's Clean Development Mechanism uses notional emissions reductions. These diverse instruments are often incompatible and of highly variable quality, even if all are denominated in tons of carbon dioxide. It is far easier to set the rules of a global carbon market at the outset than to reconcile the irreconcilable in years to come, once powerful vested interests have accreted around existing structures. So there is a need for a Kyoto process—as distinct from a continuation of the Kyoto Protocol itself—to define a future global carbon regime under the Climate Convention.

But what might a new agreement look like? It needs to be effective (deliver deep reductions in emissions quickly), efficient (do so at no greater cost than necessary), and equitable (in its allocation of costs and benefits). This will require something very different from the existing regime: a package of proposals I call "Kyoto2" (set out in detail in my book of the same name).

Under Kyoto2, there would be a global cap on emissions, and permits issued up to that cap. The whole system of national allocations and territorial accounting

is obsolete in the global economy, and it has only served to sour international negotiations and block progress. Instead, sell the permits directly to the polluters, preferably through a global auction. A uniform price sealed bid (UPSB) appears ideal for the task, combined with reserve and safety valve prices. In a UPSB auction, bids are submitted, and the lowest price at which all permits offered are sold is determined—the "clearing price." All the permits are then sold at the clearing price. The number of permits sold would reduce if enough bids above a set reserve were not received. And if bids reached the "safety valve" price, additional permits would be sold at that price to meet demand. The reserve would provide a long-term price signal for investment, while the "safety valve" would prevent economic harm from a short-term price spike, while generating additional funds for clean energy investments so as to be scale back the cap in future years without causing pain.

Anyone would be able to participate in the auction, and anyone could trade in permits. The best place to regulate greenhouse gas emissions is upstream, at or close to the source. In the case of fossil-fuel emissions, this might mean at the oil refinery, the coal-washing station, or the gas tanker. This approach automatically brings in fast-growing emissions from shipping and aviation, currently about 8 percent of the total, which fall outside the Kyoto Protocol.

This mechanism would be backed up by regulatory measures, mainly designed to overcome market failures which prevent people and companies from reducing their emissions, even where it is economic, in principle, to do so. Examples include energy-efficiency standards, applied to everything from domestic lighting to cars, computers, buildings, and power stations, and restrictions on powerful industrial greenhouse gases like HFC refrigerants, following the model of the highly successful Montreal Protocol. These regulations would be backed up by a multilateral fund to help meet poor-country costs, again following the example of the Montreal Protocol, which has largely solved the ozone depletion problem—and in the process done more to combat global warming than the Kyoto Protocol.

The sums raised by the permit auction—likely to be of the order of $1 trillion per year—would be enough to finance a full program of investments to address the causes and consequences of climate change, including all the elements discussed above: clean energy research, development and deployment; reversing deforestation; and reforming agriculture. And several others besides: financing additional health care costs imposed by climate change; providing emergency assistance to victims of climate-related disasters; supporting the United Nations Population Fund's work in providing reproductive health services (preventing millions of unwanted pregnancies, thereby preventing population size from becoming more

unsustainable than it already is); and researching geo-engineering solutions to climate change so that, if an extreme "runaway greenhouse effect" takes hold despite our best efforts, we can take remedial action to restore climate stability. The scale of the problem means that any and all solutions must be tried. The exclusive focus on clean technology, proposed by Nordhaus and Shellenberger, and the relatively meager $100 to $250 billion budget they suggest, would mean excluding many necessary and cost-effective options.

Nordhaus and Shellenberger are broadly correct in what they write. But they have failed to grasp the full scale of the hazard that we face, and the urgency of response that we need to put into place if we are to maintain a habitable planet. Global cooperation on an unprecedented scale is required. Will we, and our governments, be up to the challenge? Maybe not. But it serves no one to set our sights too low, so that even if we succeed, we nonetheless fail. D