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A Prudent Approach to Climate Change

John B. Kirkwood[†]

I. INTRODUCTION

John Kunich, an accomplished poker player as well as a distinguished environmental scholar, compares climate change policy to a gamble. Indeed, in the title of his recent book, he asserts that it is the "biggest gamble of all time."[1] The metaphor is apt. Despite years of research, a great deal of uncertainty exists about the central issues posed by climate change: How large is the threat? How imminent is it? How much can the world do to reduce the dangers? At what cost? Because of these uncertainties, any effort to address climate change will inevitably be a gamble. And the stakes are enormous. If nothing is done about climate change, the planet may face environmental catastrophe. If governments intervene aggressively, attempting to eliminate virtually all greenhouse gas emissions, the result is likely to be massive unemployment.

Kunich's solution to this monumental gamble, however, is disappointing. He does not recommend taking *any* steps to address climate change. One may search his book in vain for a single strategy he thinks ought to be adopted to reduce the adverse effects of climate change. His article in this journal is similarly devoid of affirmative recommendations.[2] Rather, he counsels caution: when the nation considers what steps it ought to take, it should err on the side of doing too little rather than doing too much. He recasts the familiar errors of decision theory as Type P errors—errors from being too passive—and Type R errors—errors from being too restless—and asserts that in dealing with climate change, Type P errors are superior:

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1. *See* JOHN CHARLES KUNICH, BETTING THE EARTH: HOW WE CAN STILL WIN THE BIGGEST GAMBLE OF ALL TIME (2010).

2. *See* John Charles Kunich, *Open-Eyes Environmentalism*, 1 SEATTLE J. ENVTL L.121 (2011).

> Type P errors tend to be the preferable form of risk in situations very much like what we find in the climate change matrix—very high cost of betting/intervening, low or dubious chance of success from getting involved, and significant doubt as to the existence of a genuine and serious threat.[3]

His article also recommends a hands-off approach, suggesting the government address climate change only as a last resort:

> Many concerns caution us to place climate change in the "last resort" category. A combination of the uncertain efficacy of corrective measures, questions about the extent and imminence of harm resulting from the unaltered status quo, and immense expenditures and opportunity costs associated with intervention makes Type P errors the rational preference.[4]

This position rests, in essence, on two judgments—the *costs* of intervention are very high while the *benefits* of action are highly uncertain. Both judgments may be correct, but they strike me as too pessimistic. There are certainly steps the government could take that are not extremely expensive, and some of them seem to have a reasonable prospect of producing significant benefits. In other words, there may be cost-effective ways to address climate change—policies that are likely to reduce the risk of an environmental catastrophe without devastating the economy. Despite the costs and uncertainties involved, despite the size of the gamble, there may be a prudent approach to climate change. In this article, I outline one.

I begin, in Part II, by emphasizing something that Kunich fully acknowledges—the worst-case climate change scenario is truly catastrophic. If climate change is allowed to proceed without any mitigation efforts, the results could be calamitous. While the probability of such a disaster may not be high, it is not zero. There is a real risk of enormous harm to the world, its people, and its species. Given the gravity of the consequences, the implication is clear: if the governments of the world can identify policies that would reduce the risk of such a catastrophe at acceptable cost, they should pursue them.

In Part III, I consider what those policies might be. I look initially at the costs of government intervention, noting that the United States and much of the world have just emerged from a major recession and the prospects for rapid growth in employment and output in most countries remain poor. As a result, immediate, dramatic action to combat climate change would be unwise. Humanity should not, as Kunich puts it, make

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3. KUNICH, *supra* note 1, at 342.
4. Kunich, *supra* note 2, at 130.

an "all in" bet to combat global warming; the costs to the world's economies would be too great. At the same time, in light of the risk of a catastrophe, it is far from clear that nothing should be done. In second portion of Part III, I look at the principal forms of governmental response to climate change and suggest two policies that seem likely to be cost effective: (1) limits on greenhouse gas emissions that are initially modest but gradually escalate, and (2) government support for clean energy research and development.

In Part IV, I address whether developed nations should adopt these policies (particularly the first) if China and other rapidly developing countries refuse to follow. China, India, and other emerging economies already account for a large share of greenhouse gas emissions, and these countries have expressed reluctance to take steps that would inhibit their economic growth, at least until they reach a level of development comparable to nations like the United States. Here again, Kunich is correct: the participation of these countries is sufficiently important, both to the prospects of mitigating climate change and to the United States' ability to compete in global markets, that developed nations should not take major steps without commitments from these countries. But there are diplomatic tools that can be used to encourage participation, and some may be particularly effective in inducing China and other rapidly developing nations to act.

II. THE SEVERITY OF THE THREAT

There is little doubt that the world is warming. In a recent article in the prestigious journal *Nature*, Quirin Schiermeier notes that "the most recent decade was the warmest on record."[5] He also points out that the "current rate of warming is in all likelihood unique in the history of humankind."[6] To be sure, there is no definitive evidence that humans have contributed to this alarming rise in temperatures. Average world temperatures have risen before only to fall later, and these cycles occurred long before industrialization began injecting large quantities of greenhouse gases into the atmosphere. Is it possible that the globe is simply experiencing another cycle in the world's weather? Schiermeier is doubtful. He states that there is a substantial support for the fundamental conclusion that humans are warming the climate, specifically "the extreme rate of the twentieth-century temperature changes and the inability of

5. Quirin Schiermeier, *The Real Holes in Climate Science*, 463 NATURE 284, 286 (2010).
6. *Id.*

climate models to simulate such warming without including the role of greenhouse-gas pollution."[7]

As Kunich emphasizes, not everyone agrees that humans have played a significant role in global warming. Nor is it certain that rising temperatures, if left unchecked for decades, would cause devastating damage to the environment and its inhabitants. There is widespread agreement, however, that climate change poses a major *threat* to the world. In the very title of his book, Kunich characterizes the policy decision as "Betting the Earth."[8] His article calls climate change a "mega-magnitude" challenge that involves the "fate and survival of our planet."[9] He states: "Challenges facing the environment today are literally Earth-shaking in their magnitude, with the potential to affect the entire planet for hundreds of years to come, and beyond."[10]

Peter Singer, a prominent bioethicist at Princeton, concurs. Debating Bjorn Lomborg in *The Wall Street Journal*, Singer cited a World Health Organization study that found global warming has already resulted in more than a hundred thousand fatalities annually:

> According to the World Health Organization, the rise in temperature that occurred between the 1970s and 2004 is causing an additional 140,000 deaths every year (roughly equivalent to causing, every week, as many deaths as occurred in the terrorist attacks of Sept. 11, 2001). The major killers are climate-sensitive diseases such as malaria, dengue and diarrhea, which is more common when there is a lack of safe water. Malnutrition resulting from crops that fail because of high temperatures or low rainfall is also responsible for many deaths.[11]

Singer also described the best known threat from global warming: rising sea levels, which would flood coastal areas, displace millions of people, and make it harder for them to obtain the fresh water they need. Singer wrote:

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7. *Id.* at 284; *see also id.* at 286 ("Records of thermometer measurements over the past 150 years show a sharp temperature rise during recent decades that cannot be explained by any natural pattern.").

8. *See* KUNICH, *supra* note 1.

9. Kunich, *supra* note 2, at 122.

10. *Id.* at 121.

11. Peter Singer, Editorial, *Does Helping the Planet Hurt the Poor? No, if the West Makes Sacrifices*, WALL ST. J., Jan. 22, 2011, http://online.wsj.com/article/SB10001424052748703779704576074333552233782.html. The counterpoint article is Bjørn Lomborg, Editorial, *Does Helping the Planet Hurt the Poor? Yes, if We Listen to Green Extremists,* WALL ST. J., Jan. 22, 2011, http://online.wsj.com/article/SB10001424052748703779704576074360837994874.html.

> Fertile, densely settled delta regions in Egypt, Bangladesh, India and Vietnam are at risk from rising sea levels … In 2007 the UN's Intergovernmental Panel on Climate Change found that a temperature rise in the range of 2 to 2.4 degrees Celsius by 2080 would put stress on water resources used by 1.2 billion people. Rising sea levels would expose, each year, an additional 16 million people to coastal flooding. A temperature rise limited to two degrees by 2080 now seems about the best we can hope for, and recently there have been alarming indications that sea level rises could be much greater than the IPCC anticipated.[12]

These adverse consequences are especially troubling because they would disproportionately affect some of the most vulnerable populations on earth. Climate change, in other words, not only places the environment at risk, it also threatens to worsen the plight of the worst off, increasing economic inequality. Moreover, a warming globe will likely produce more severe storms and raise the probability of famine, two trends that could have dire consequences for many people. Finally, as Kunich notes, climate change could lead to the extinction of numerous species.

In the worst-case scenario, in short, climate change would have extreme consequences for the planet and its inhabitants—killing, dislocating, sickening, starving, or otherwise harming millions of people and extinguishing thousands of species. Although the likelihood of this scenario is unclear, it would be devastating if it occurs. On this issue, Kunich and Singer agree. In Singer's words, there is a "very real risk that climate change will turn out to be a disaster on an unprecedented scale."[13]

If nothing is done about climate change, in other words, the world would court a whirlwind. It would not be prudent to incur such a risk unless there were no cost-effective ways to mitigate it. Fortunately, that does not appear to be the case. At least two forms of governmental action, and perhaps several more, may reduce the adverse effects of climate change without incurring unacceptable costs.

III. COST-EFFECTIVE GOVERNMENT ACTION

Kunich argues that, above all else, the United States should not take drastic action to combat global warming. The nation should not make an "all in" bet, committing a large proportion of its scarce resources to stopping climate change. While Kunich may feel that no governmental action would be cost-effective, a judgment that is questiona-

12. Singer, *supra* note 11.
13. *Id.*

ble, I agree with him that dramatic action does not make sense at the present time. The macroeconomic context is highly unfavorable to major governmental intervention.

The United States is slowly emerging from the Great Recession, one of the most serious financial crises in the nation's history and the worst since the Great Depression. The crisis led to a huge government bailout of the finance sector, a substantial drop in national output, and a large increase in unemployment. Two years into the recovery, unemployment remains high, with the ranks of the long-term unemployed larger than at any time since the 1930s. Economic growth is halting and painfully slow. Further, the federal government is incurring budget deficits that are unprecedented in absolute magnitude and proportionally higher than at any other time since World War II. In the next few years, moreover, the nation is unlikely to see a major improvement on any of these fronts. Although economic growth is likely to pick up, unemployment is likely to fall, and the deficit is likely to be reduced, no serious forecast predicts a sharp, sustained rebound in any of these areas.

At the present time, then, a ban on most greenhouse gas emissions would be unwise. Such a draconian restriction on traditional energy use would seriously harm a fragile and slow-growing economy and swell the ranks of the unemployed. While a ban would reduce the likelihood of an environmental catastrophe, the probability of such a disaster does not seem to be so high that it would be prudent to throw the economy into reverse, multiplying job losses, depressing income and wealth, and widening the government deficit. The prudent path lies somewhere between doing absolutely nothing about climate change and doing everything possible.

Some form of limited government intervention, in short, is the most the nation can handle at the present time. Indeed, with control of the government split between Republicans and Democrats, that is the most that can be accomplished politically as well. Moreover, since any climate change decision is fraught with uncertainty, any future policy should adhere, to the extent possible, to the following principles, all of which are useful in making decisions under uncertainty. First, the government should *diversify* its approaches. That is, an attack on the problem should come on multiple fronts rather than relying exclusively on a single approach. Second, the government should *experiment*. It should see how each policy works and then adjust the policy and/or the resources devoted to it accordingly. Finally, the government should seek *ancillary benefits*. That is, in selecting approaches, priority should be given to those that will achieve other goals. Thus, even if a policy ends

up having relatively little impact on global warming, it will have positive effects in other areas.

The most promising approaches to climate change fall into three broad categories: (1) limits on greenhouse gas emissions; (2) adaptation; and, (3) clean energy research and development.

A. Limits on Greenhouse Gas Emissions

Congress could limit greenhouse gas emissions in a variety of ways. It could put a ceiling on them, it could combine ceilings with tradable emission permits (cap and trade), it could impose a tax on emissions, or it could direct the Environmental Protection Agency (EPA) to regulate them through the Clean Air Act. These methods differ in how easily they may be administered and how cost-effective they may be. In a longer article, I would compare them and evaluate their relative desirability; in this article, I will address a broader issue: How severe should the limits be? Whatever method Congress chooses, how far should the government go in attempting to reduce greenhouse gas emissions?

One prominent proposal would limit emissions to such an extent that the global mean temperature does not rise more than two degrees Celsius by the end of this century. This approach would not preserve the environmental status quo, but it would forestall more alarming temperature increases. It would also be quite costly. Studies of the issue have concluded that emissions limits of this magnitude would result in a reduction of approximately 1–2 percent in total economic output. While this sacrifice does not seem large in percentage terms, it is substantial in absolute terms. In a $15 trillion economy, a 1–2 percent reduction in GDP would mean $150-300 billion in lost output each year, a difference large enough to provide health insurance to 10–20 million families.[14] A reduction in output of that magnitude could also increase unemployment by 1–2 million people.[15]

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14. This figure is based on the average cost to provide a U.S. household with health insurance, a figure around $14,000 a year and rising. *See* Press Release, Kaiser Family Foundation, Family Health Premiums Rise 3 Percent to $13,770 in 2010, But Workers' Share Jumps 14 Percent as Firms Shift Cost Burden (Sept. 2, 2010), http://www.kff.org/insurance/090210nr.cfm.

15. This follows from "Okun's Law," a rule of thumb developed by Arthur Okun that relates changes in unemployment to changes in Gross Domestic Product (GDP). It suggests that a percentage point decline in GDP is roughly associated with a percentage point increase in unemployment.

At present, the national unemployment rate is 9.1 percent, the labor force consists of approximately 150 million people, and there are more than 13 million people unemployed. As a ballpark estimate, therefore, a decline in GDP of 1-2 percent would increase unemployment by at least 1-2 million people. Economic and employment data is compiled and published by the U.S. Dept. of Labor, Bureau of Labor Statistics. *See* BUREAU OF LABOR STATISTICS, EMPLOYMENT SITUATION, http://www.bls.gov/news.release/empsit.toc.htm (last visited June 13, 2011).

These are large costs, and it is probably not sensible to incur them in the short run, given the state of the economy and the uncertainties about the size, impact, and reversibility of global warming that Kunich has described. It seems prudent to begin with modest measures, then increase them over time, particularly if experience (and growing knowledge of climate change) suggests that increases are in order.

Michael Porter, one of the world's leading authorities on business strategy, and Daniel Esty, a former EPA official and current environmental law professor at Yale, recommend such an approach. They propose "an emissions charge of $5 per ton of greenhouse gases beginning in 2012, rising to $100 per ton by 2032."[16] They note that the "low initial charge, starting next year, would make the short-term burden on consumers and businesses almost negligible."[17] They also stress that their proposal would have numerous ancillary benefits. Imposing a price on carbon would reduce the U.S. trade deficit because less oil would be imported. For the same reason, fewer dollars would flow to violent fundamentalists in oil-rich nations, enhancing national security. The carbon charge would also curtail air pollution by decreasing the combustion of fossil fuels. And the federal deficit is likely to be reduced because of the additional tax revenue generated by the carbon charge. Finally, their proposal would stimulate innovation:

> In the longer term, the prospect of a steadily rising emissions charge would focus the private sector's attention on energy-saving and carbon-reducing innovation. The calculus for investments would immediately change. Anyone pursuing an energy-consuming project, like a power plant, would factor in the rising long-term charge into their choice of technology … Entrepreneurial spirit would be unleashed in companies from multinational enterprises to back-of-the-garage inventors.[18]

Even this proposal may be too ambitious. It is not clear that emission charges should escalate as rapidly as Porter and Esty propose; given the current state of the economy, a more moderate rate of increase may be preferable. But whether the cost increase is rapid or gradual, it makes sense to create a fixed schedule so as to make investment planning

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16. Daniel C. Esty & Michael E. Porter, *Pain at the Pump? We Need More*, NEW YORK TIMES, Apr. 28, 2011, at A25, *available at* http://www.nytimes.com/2011/04/28/opinion/28esty.html.

17. *Id.*

18. Esty & Porter, *supra* note 16. In a recent column, Thomas L. Friedman cited similar ancillary benefits in making the case for a tax on carbon emissions. *See* Thomas L. Friedman, *Bibi and Barak*, NEW YORK TIMES, May 18, 2011, at A19, *available at* http://www.nytimes.com/2011/05/18/opinion/18friedman.html ("We are going to have to raise taxes. Why not a carbon tax that also reduces energy consumption, drives innovation, cleans the air and reduces our dependence on the Middle East?").

easier. Without a reliable schedule, entrepreneurs and businesses would have a more difficult time estimating the future cost of carbon-based energy and thus a harder time calculating whether clean-energy projects would be financially worthwhile. To stimulate innovation, in short, a fixed schedule is desirable, even though it would commit the government for a period of time to prescribed emission limits, reducing the government's ability to experiment and adjust.

B. Adaptation

Emission limits are intended to curb the extent of future climate change. Adaptation strategies are designed to help people cope with the effects of climate change that is likely to occur whatever emission limits are adopted. For example, governments can provide food, water, and relocation assistance to residents whose lands are likely to flooded by rising sea levels. At the present time, however, relatively few people need such assistance. While residents may need shelter and other help after a hurricane or tornado, such emergency relief is largely available through existing government and humanitarian sources.

To be sure, climate change may increase the frequency and intensity of such storms, as well as exacerbate the incidence of drought and famine, but predicting in advance which countries are likely to be most affected is difficult. As one scientist observed, "Our current climate models are just not up to informed decision-making at the resolution of most countries."[19] At this time, then, it seems premature to commit large amounts of additional resources to adaptation assistance. The United States may need to make such commitments in the future, but other climate change strategies are more pressing in the short term.

C. Clean Energy Research and Development

The ideal solution to climate change is the development of new forms of energy generation that are both cheap and clean. These technological breakthroughs would use few resources to produce power and would emit no greenhouse gases or pollutants. Moreover, they could take any form: they could be a radically different type of energy from anything available now, or they could be a dramatic improvement on an existing source of power generation, like wind or solar.

The allure of such a prize motivates many people to recommend clean energy research and development. Esty and Porter, for example, advocate escalating charges on greenhouse gas emissions in part because they would make it more profitable for businesses and entrepreneurs to

19. *See* Schiermeier, *supra* note 5, at 285.

engage in clean energy research and development. As they note, a price on carbon would also give consumers as well as producers an increasingly powerful incentive to switch to whatever new, less carbon-intensive technologies are developed.[20] Likewise, Bjorn Lomborg supports increased research and development, though he believes governments should fund it directly rather than stimulate it through emissions taxes, which he believes would prove too harmful to economic growth. Lomborg is quite willing, however, to commit substantial funds to research and development, declaring: "[W]e should spend about $100 billion a year on research and development to make green energy cheaper and more widely available."[21] Singer also endorses the "need for more investment in research and development," whether it is funded directly by the government or stimulated by some type of emission limit.[22]

Government-sponsored research and development is not without problems. The government would have to choose which projects to fund, and decisions made by government agencies are more likely to be politically motivated and less likely to be commercially sound than decisions made by entrepreneurs with an economic interest in success.[23] But government-funded research has historically led to spectacular successes (e.g., the Internet, GPS), and much of it has probably been more useful than wasteful. Moreover, unlike limits on carbon emissions, government-sponsored research is likely to have an entirely stimulative effect on the economy.

In short, a prudent approach to climate change should consist of two elements: (1) substantial government funding for clean energy research and development, and (2) limits on greenhouse gas emissions that begin at a modest level but gradually escalate in accord with a predetermined schedule.[24] Even this moderate program, however, is unlikely to

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20. For the same reasons, Friedman recommends a tax on carbon emissions. *See* Friedman, *supra* note 18.

21. Lomborg, *supra* note 11.

22. Singer, *supra* note 11 ("Such investment could be funded by a carbon tax or, under a cap-and-trade scheme, by the sale of quotas to emit carbon. Either of these methods of putting a price on carbon would in itself create further economic incentive for the development of green energy.").

23. *See* Esty & Porter, *supra* note 16 ("Experience in fields like information technology and telecommunications suggests that creating demand for innovation is far more effective than subsidizing company-specific research projects or providing incentives for particular technologies. Governments just aren't good at picking winners; witness the billions wasted on corn-based ethanol subsidies.").

24. As noted earlier, there are many types of emission limits. I favor taxes over ceilings because the former are easier to calculate and administer, and send clearer signals to other businesses. But the choice among types is not critical. As Singer indicated, any type of limit will put a price on greenhouse gas emissions. Moreover, ceilings are likely to be easier to enact than new taxes.

be adopted if China, India, and other rapidly developing countries refuse to participate.

IV. CHINA AND OTHER RAPIDLY DEVELOPING COUNTRIES

The developing countries have a sympathetic argument for refusing to take major steps to limit greenhouse gas emissions. The United States and other developed countries have historically been the world's largest source of greenhouse gas emissions. For years, they poured large quantities of greenhouse gases into the atmosphere as their economies expanded and their citizens attained an increasingly high standard of living. Why shouldn't China, India, and other developing countries be allowed to do the same thing until their citizens achieve a comparable level of prosperity?

The answer is simple: no major emitter of greenhouse gases is likely to limit its emission unless other major emitters do so as well. The United States and Europe may devote substantial funds to research and development, but the international community is unlikely to adopt material and binding restrictions on greenhouse gas emissions unless China and India make comparable commitments.

Neither the U.S. nor the EU will allow themselves to be placed at a competitive disadvantage relative to these countries. Moreover, the adverse effects of climate change are unlikely to be reduced substantially unless all the major emitters act together; greenhouse gas emissions and climate change do not respect national boundaries. As a result, the developed countries and the leading developing nations are engaged in what Kunich calls "the longest and highest-stakes game of 'Chicken' in history, with all key players daring the others to move first."[25]

Unless this collective action problem is solved, the world is unlikely to do anything important about climate change until a calamity occurs.[26] To move forward, therefore, the United States and the European Union should agree on a program they would implement if China, India, and other rapidly developing nations agree to follow, and then use diplomatic and other tools to bring these countries into line. For instance,

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25. *See* Kunich, *supra* note 2, at 131. ("The United States never even ratified the Kyoto Protocol because of concerns that its economy would be placed at a major disadvantage compared to its burgeoning competitive rivals, including [greenhouse gas] giants such as China and India. The United States' inertia is complemented by the reluctance of such emerging/developing economic powers to accept restrictions on their own emissions that could disrupt their progress before reaching a level of prosperity, quality of life, and social stability similar to that of the United States.").

26. China may take some actions that are grounded in its own interests, like imposing penalties on inefficient power plants, since those actions reduce its own air pollution and lower its own energy costs. But China is unlikely to curb greenhouse gas emissions in a much more substantial way, unless other large emitters do at least as much.

the U.S. and EU could offer increased economic cooperation and investment as a reward for participation. In addition, they could threaten to impose trade sanctions if China, India, and other major developing nations do not adopt comparable emissions limits. To be sure, trade sanctions may provoke a trade war, which could lead to worldwide reductions in employment, output, and economic growth. But to end the game of Chicken and reduce the risk of an environmental catastrophe, the threat of a major economic disruption may be needed.

V. CONCLUSION

A prudent approach to climate change would not ignore the problem. The risks of inaction are too significant. If the world fails to take steps to avert global warming and simply waits to see what transpires, future generations may witness a human and environmental disaster of the first magnitude. At the same time, it would be unwise to impose major, immediate curbs on greenhouse gas emissions, given the uncertainties that pervade this area and the precarious state of most economies. A prudent approach to climate change would consist of moderate steps that have a reasonable chance of being cost effective.

In this article, I suggest two: (1) substantial government funding for clean energy research and development, and (2) limits on greenhouse gas emissions that are initially modest but gradually escalate in accord with a predetermined schedule. Both steps would move the economy away from traditional, carbon-based sources of energy and toward technologies that would have fewer adverse effects on the world's climate. The increase in funding for R&D would simulate innovation directly; the emissions limits would do so indirectly, making it more costly for producers and consumers to use older, more carbon-intensive technologies and more advantageous to develop cleaner alternatives. Both policies, moreover, could be expanded or accelerated if the risks of climate change appear greater or more likely than they do now.

If this program is in fact sensible, it will be easier to persuade China, India, and other emerging economies to adopt something comparable. And if more than persuasion is required, there are diplomatic and other tools available, including the threat of trade sanctions if these countries insist on free riding on the climate change efforts of the developed world.

Kunich is right: climate change policy is a gamble. But since we are "betting the earth," it is a game we should not sit out.