

International Coordination to Address the Climate Challenge

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Climate change is real, but its future is marked with uncertainties. We cannot predict the kinds of societies that will be faced with the most severe impacts of climate change fifty years or a century from now: What sort of lives will people lead? What kinds of technologies will they use?

Still, we do know some things about the future effects of climate change, and with high confidence. Above all, we know that “developing” countries will experience the greatest impacts from climate change. (I put “developing” in quotes because many of the places to which this term refers are, in fact, not developing: today they are, regrettably, simply poor.) For the countries most vulnerable to climate change, the most reliable defense lies in economic development itself. The advanced industrial countries that have been primarily responsible for bringing

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about climate change will most likely not experience its most severe impacts. They have a responsibility to assist both poor and genuinely developing countries to find a path of development that does not exacerbate global harm. More urgent, it is unlikely that China, India, Brazil, Indonesia, and other large emitters of greenhouse gases can be induced to participate in massive changes in energy supply and use without substantial assistance from the countries that can afford to assist.

Bilateral aid is probably not the right approach for mobilizing such aid and directing it toward the most promising investments. For example, a bilateral relation between China and the United States to help finance Chinese energy improvements would probably get tangled in other issues like Taiwan, North Korea, civil rights, exchange rates and trade policy. Institutions that isolate energy and climate from other politics will certainly be preferred.

We can learn from a few from models of actual international cooperation. The purpose of this essay is to describe precedents for such collaboration, and how it might be structured to best address the climate challenge.

warming. In 2005 he received the Nobel Prize in economics, shared with Robert Aumann, for “having enhanced our understanding of conflict and cooperation through game-theory analysis.”

WHAT WE KNOW AND DON'T KNOW ABOUT THE IMPACT OF CLIMATE CHANGE

Unique to our solar system, Earth has a combination of carbon dioxide and water vapor that keeps the planet both warm and cool enough. Atmospheric moisture doesn't freeze solid, nor does it become so hot that it all evaporates. We have known for a century that Mars, lacking a greenhouse atmosphere, is too cold for water to exist as a liquid. Venus's dense greenhouse atmosphere has the opposite effect: water exists only as steam. Furthermore, we've known that if you shine an infrared light through a chamber full of carbon dioxide, less of it comes out of the other end. An observer can monitor a proportional difference between the reduced infrared light and the rise in temperature of the carbon dioxide in the chamber.

Of course, climate change is a much more complex phenomenon than is suggested by this experiment, and by the formerly dominant term, “global warming.” What is more, even when we talk about “climate change” we are really talking about change in hundreds of climates around the world, all different from each other, all potentially affected by concentrations of greenhouse gasses in different ways. Some places will get hotter as a consequence of climate change, a few will get cooler; some will get cloudier, some will get sunnier. Some will get more storms, some will get fewer storms; some will suffer drought and some will suffer flooding, some may suffer both. Climates differ between east coasts and

west coasts of continents, between high altitudes and low altitudes, between northern and southern hemispheres.

From the standpoints of both science and policy, global averages do not tell the whole story. The way that climate change affects very specific places has enormous implications for future human well-being. For example, we know very little about what kind of climate change will occur above 3000 meters. Only a few Tibetans and Bolivians live at such altitudes. However, a great deal of the water that irrigates agriculture around the world depends on snow that falls in the winter in the high mountains and then melts gradually, beginning in late spring and continuing through the summer irrigation season. If, above 3000 meters, what used to fall as snow now falls as rain, farms lose that moisture unless they can rely on a huge infrastructure to capture it. And if it falls as snow but melts too early in the spring, farmers can't use it for irrigation because it has already flowed to the oceans. Thus, what happens at high altitudes will affect few people directly, but it will have a crucial impact for the more than three billion people who live in China, India, and Southeast Asia, and in Peru, Chile, and Argentina, not to mention California and Colorado.

That significant uncertainties exist regarding the dynamics of climate in the long term should come as a surprise to no one. While the science underlying the phenomenon of climate change has been well understood for a century, the inter-

disciplinary field of climate science has developed only during the last couple of decades. However the biggest uncertainty, I believe, arises not from our understanding of the climate itself, but from our vision of the kinds of societies that will exist in the second half of this century—the societies that will experience the most significant impacts of climate change. To consider the effects of climate change on human populations over time, we are compelled to consider how a changing planet will affect the way people live and work in the second half of this century.

To illustrate this idea, imagine that we are in the 1920s, when I grew up, and consider the climate challenge from the point of view of people living then. What sorts of concerns would they have projected upon us, the people of the future? Clearly people in the 1920s would have been far less interested in hotter summers than warmer winters. In the United States, especially, many would have worried about what would happen to roads. How much mud would a change in seasons bring about? Back in the 1920's, automobile tires measured about two and a half inches in diameter. Pumped up to 60 lbs. per square inch, they felt and acted like wood. One of my uncles made money every summer using a team of horses to pull automobiles out of the mud in the road near his house.

So we remain uncertain, even in our imaginations, of how people will earn their living, even how they will entertain themselves, not only in the United States but in Sub-Saharan Africa, Southeast Asia, and the Andes.

Developing countries will see the worst damage. People in the developing world depend on outdoor activity—particularly agriculture—to a far greater extent than do people in advanced industrialized countries. Agriculture in the United States and in most of the rest of the developed world—whether in France, Germany, Japan, Israel, or Norway—accounts for less than five percent of gross domestic product. Whatever happens to agricultural productivity, Americans will likely be able to afford higher-priced food. Today, so few American farmers make their living from agriculture that the Census Bureau has stopped counting them. If the cost of food goes up as a consequence of climate change, the world's poor will suffer most. Americans, by the time all of this happens, will likely have doubled their per capita income. The developing world is particularly vulnerable to climate change. Their best defense against climate change is their own development.

We should not compel developing countries to drastically transform their energy sectors in order to slow climate change, but we must offer them coordinated and well-considered assistance to do so. Anything that slows down their own development will worsen their situation as climate change occurs.

Conversely, potential donor nations have been reticent to fully endorse efforts to stop climate change at the expense of their own economic growth. In 1997, at the time of the Kyoto Conference that led to the draft treaty about climate change, the US Senate unanimously passed a resolution: it would not ratify any climate treaty in which the major developing countries did not participate fully. As president, Bill Clinton said that he would not submit the treaty to the Senate for ratification until diplomacy had brought China and India and other major developing countries into compliance with a Kyoto-type program. That administration did nothing. Then we had a president who either didn't believe in climate change or pretended not to. I think we now have a president who does believe in it and who takes it seriously, and Congress has begun to take it seriously as well.

As for international action, I'm not optimistic about anything of great substance coming out of the upcoming Copenhagen Conference. If there were substantial agreement among major parties, worked out over the preceding six months, Copenhagen might generate the finishing touches. But the participants in the conference cannot accomplish much new work over only two weeks in Copenhagen.

Among the ideas that I do not believe will get serious attention in Copenhagen is one I see as critical to addressing the climate challenge: creating a new institutional structure to coordinate assistance from advanced industrialized

countries toward developing countries with the objective of transforming the way that people in the developing world produce and utilize energy. If we want China, India, Brazil and others to transform their energy sectors drastically, they must engage in costly and systemic transformations of their energy infrastructures. The array of actions they must take will include removing carbon from the emissions of power plants and putting it underground permanently, developing wind or solar power on a large scale, and converting from coal to oil or natural gas. To make such changes will require assistance from advanced industrialized countries.

A PROPOSAL AND ITS PRECEDENTS

Rich countries will need to negotiate how they will share the cost of contributing resources to the developing world. Countries within the European Union, the United States, Canada, Japan, Australia, and New Zealand will need to find a way to agree upon how much they will put up to help major countries in the developing world to transform their energy economies, and how they will share the costs of transferring resources to the countries that most need to transform their use of energy. .

We will also need some kind of institution within which the major developing nations that will have the greatest impact on the greenhouse problem (China, India,

Brazil, Indonesia and a few others) can decide how they will share in whatever resources the rich countries make available for the purpose of transforming their energy sectors.

The recipients should also declare what they will commit themselves to do in return for the kind of help they may get. Ideally, potential recipients within the developing world would negotiate among themselves on how to share the money made available by the rich countries. Of course they may not agree at first; after all, India and China battled barely 45 years ago and they still have military confrontations in the Himalayas. The institution would provide a forum where they can at least attempt to reach an agreement on how they would share what the rich countries have made available.

A third institution would channel funds to the developing world, acting as an intermediary between the donor countries and the receiving countries that does not rely on bilateral relations. We will need this intermediary agency to monitor what recipients do with all of the funds, to create an entire climate-oriented investment program in each recipient country. The recipient countries must have a coherent program for making changes in their energy sector, and a subsequent plan to channel the internationally transferred funds to specific projects. Donor countries

should not simply finance one or two particular investments that substitute for what the country itself might have done.

I can't think of any precedent in the last 50 years for what I suggest. However, the Marshall Plan provides a model whose potential has intrigued me for years. During the early years of the Marshall Plan, beginning in April of 1948, the United States first contributed \$5 billion for a 15-month period to the 15 countries of Western Europe that constituted the Organization for European Economic Cooperation (OEEC). The initial \$4 billion per year represented about two percent of the US gross national product—a lot of money. The United States divided it up among the recipient countries of Western Europe. For the second year, spanning 1949 to 1950, the United States said it would appropriate a lump sum for the Europeans to divide among themselves.

That was quite a challenge. The OEEC had to develop detailed questionnaires that every recipient nation filled out in order to indicate how much aid it qualified for and how much it requested out of the forthcoming total. This involved making up national accounts, something that was brand new in the United States and no economist in Greece knew anything about. They suddenly had to figure out how to allocate their gross national product—relative to Marshall Plan funding—between public investment, private investment, and private consumption. These investments could take the form of anything from repairing roads and railroads and dredging

canals to building schools and homes and hospitals. The nations even had to decide how to ration gasoline, meat, and butter.

They spent six months developing this program, essentially a claim for a part of the resources that the U.S. would make available. At the ministerial level in Paris, they negotiated for about six weeks, cross-examining each other and bearing in mind that more for one country meant less for the rest of them. They negotiated peacefully, on a first-come basis and in good will, and reached nearly final agreement. Then the Secretary General of the OEEC and the Belgian delegate -- Belgium didn't ask for any portion-- went off to Fontainebleau and spent a weekend preparing a proposal for how to share the funds among the 14 countries that had applied. They came back and presented it to the ministers of the 14 countries, and the delegates unanimously accepted the division.

This is the only precedent I have ever found of countries getting together and, in gentlemanly fashion, negotiating how to share a crucially large lump sum of resources, available only if they could find a way to divide it among themselves.

Have recipient countries ever agreed on how to share their own contributions to a joint project? A few precedents do exist, again from 50 or 60 years ago. In 1951 the Marshall Plan became the Mutual Security Program and aid became tied to the burdens that European countries would bear if they would share in NATO defense.

Again they went through something like what had happened with the Marshall Plan division in 1949-50, the “Burden-Sharing” Negotiation. In 1951, the United States made aid to Western Europe available only in connection with commitments that the recipient countries would undertake, such as the number of men they would raise for the armed forces, the number of months they would train them, and the amount of time they would serve. Commitments also included their expenditures for military equipment and ammunition, and provision of real estate for military maneuvers, NATO pipelines, military housing, and the like.

The NATO treaty differs significantly from most climate change treaties in that the NATO signatories declared what they would do, instead of stating results 20 or 30 years down the road. The Dutch didn't say, “We will contribute to retarding a Soviet invasion by two and a half days.” And the French didn't say, “We will contribute enough to reduce the likelihood of a Soviet attack by two and a half percent.” Instead, they committed themselves to the troops they would raise, the money they would spend, and the real estate they would make available. Therefore they knew whether or not they kept their commitments—and so did everybody else. You could look and see what they had done. And in fact NATO commitments were substantially carried out. That suggests to me strongly that a treaty or an agreement on what to do about reducing greenhouse gas emissions has

greater odds of success when countries commit to actions they will take rather than to results in the year 2030 or 2050.

To say that we will reduce greenhouse gas emissions by 50% by 2030 or by 80% by 2050 doesn't indicate what steps we need to take. Along the way no one will be able to say whether our completed activities will contribute to what needs to happen by the long-term target.

In response to this issue I see another precedent, the one set in 1946 by the Bretton Woods negotiation, which established the International Bank for Reconstruction and Development and the International Monetary Fund, both of which required contributions to their capital assets. Both institutions had to sell bonds to accumulate funds and then lend out the funds for reconstruction and development or financial solvency, and they needed capital assets. The capital assets had to come from the countries that could afford to contribute, and donor countries had to negotiate to determine how much and in what currencies the various contributing countries would make their contributions. They managed to arrive at an agreement. The IMF and the World Bank did get funded and established, and have operated for more than a half a century.

On the other hand, some other precedents warn us to be cautious about agreements to share costs or revenues. Consider the League of Nations after World War I. Seeking an appropriate model to replicate, it found one in the International

Postal Union of 1874, which taxed its participants for shares in the funds that the union needed. The league ultimately experienced the same results as the union had.

[Note from the editor: Might it be possible to summarize those result in a sentence

or two here?] The Postal Union formula involved geographical size, population size, and a few other variables, none of which corresponded to any notion of “ability to pay” or likely benefits from the union.

And consider the United Nations. After World War II, it tried to establish something analogous to a progressive income tax: countries with a higher per capita income would contribute a higher share of the UN budget. It largely turned out that way, except that the UN had a special problem: the United States played such a huge role in the world economy that almost any reasonable formula would require it to contribute more than half of all the funds. Not only did the U.S. find that unacceptable; most other countries felt it would create a dominating situation for the United States. The U.S. ended up with a share of slightly more than one third of the total. The UN also engages in separate negotiations for specific programs like peacekeeping; different countries negotiate shares of the costs depending on where the peacekeeping occurs. These and other myriad examples illustrate the problems that a new multi-lateral institution may confront.

USES OF A GLOBAL FUND

How would the resources gathered by such a fund be spent? To fully enumerate the options for each place, and speculate on priorities, is well beyond the scope of this essay. Other contributions to this special issue of Innovations provide some ideas. I believe it important to identify the aid with specific projects. Pure financial transfers are likely to appear as bribery or extortion. Here I offer just two illustrative examples.

Countries like China or India, with a vast wealth of natural resources and a steep curve of improvements in industrial infrastructure expansion, will require a huge number of investments, and large ones. Wind power is an attractive source of energy that involves no greenhouse gas emissions in its operation. However, wind power depends on the wind blowing fairly regularly. And the turbines cannot lie too far from the electricity's destination because transmitting that electricity does cost something, especially if it has to go a few thousand kilometers. China has an exceptional potential for developing wind energy, especially in northeast China and Manchuria. Tibet has an enormous amount of steady wind, but Tibet lies far away from the areas that most need electricity. If China had the funds to reduce its dependence on coal, wind power might present itself as a more than viable option. China has advanced significantly in developing ways to convert sunlight directly

into electricity, but by nature that technology requires huge installations and lots of investment.

A second example is capturing carbon dioxide as factories emit it, which has spurred a great deal of interest recently. Carbon capture and sequestration takes the carbon dioxide that comes out of a smokestack, separates it from the rest of the gases, converts it into a liquid-like substance (called its super critical form), and subsequently requires transport to sites that can handle deep storage underground. (See the case narrative authored by Frank Alix in this issue.) Oil companies have used this technique for 30 or 40 years to get more oil out of depleted wells. This could mean that China, which has enormous coal deposits and is building coal-fired electric power plants at the rate of more than one a week, can exploit its valuable coal resources, separate out much of the carbon dioxide, and inject it underground to seal it in. That will require a lot of geological exploration and experimentation. The process is expensive because it includes constructing a whole plant to capture the carbon dioxide and the pipelines to inject it underground.

CONCLUSION

Who will lead in creating the sort of institution I have tried to describe? To my knowledge, no part of the US government is currently focused on ensuring we have the institutional structure we will need: one that will allow the rich countries

to coordinate their climate assistance to developing countries, and allow the developing countries to determine how to allocate funds toward the projects with the highest global return, and that can monitor and account for the way the aid is invested.

To address the climate challenges we must find mechanisms so that those countries in the developing world that are most likely to contribute to growth in carbon emissions over coming decades can upgrade and transform their energy infrastructures in ways that do not cripple their own development. The multilateral nature of the climate impacts demands that solutions come about through a multilateral process. Though we cannot know the particular paths by which we will avoid the most severe consequences of climate solutions, we can act now to lay the foundation.