Enviro A

Uncertainty and action on climat

By Thomas Schelling

THE uncertainties about climate change are many and great. How much CO2 may join the atmosphere if nothing is done about it? How much global warming will it cause, and how will local climates, ecosystems, and vulnerable species be affected? What impact will such changes have on productivity, comfort, and health? And, of course, what are the likely costs of shifting to renewable energy sources and energy conservation?

As more becomes known about climate change - for example, the role of clouds and oceans - more uncertainties emerge. Nevertheless, the greenhouse "theory," as it is sometimes disparagingly called, has been established beyond responsible doubt. There is uncertainty about the quantitative parameters, and there can be doubt about whether the warming of recent decades is entirely due to the "greenhouse effect." But the basics of global warming are not in scientific dispute.

If we know that the earth is warming, but are uncertain about how fast and with what effects on climates worldwide, what are the most urgent steps that we should take to address it? One, of course, is to keep studying climate phenomena and their ecological impact. Another is to promote research and development aimed at remediation. We urgently need to understand what alternatives to fossil fuels there will be, how much energy can be conserved, how to extract CO2 from the atmosphere, and, if necessary, how to increase the earth's albedo, its reflectance of incoming sunlight.

One way to ensure the necessary R&D is to rely on the market to finance and direct the work by using taxes, subsidies, rationing, and - most important - by convincing firms and consumers that fossil fuels will become progressively more costly. But private interests will not undertake some essential R&D under any circumstances; the "market" will not induce the necessary outlays, because investors cannot capture all the benefits of moderating global warming for the human race.

So the other option is for governments, cooperatively with business, to finance and direct R&D. For example, it has long been understood that CO2 produced in large stationary plants like electric power stations can be "captured" and piped to where it can be injected into underground caverns (or possibly ocean beds). Twenty-five years ago, it was estimated that this process would double the cost of electricity; it now appears that costs may be more modest. But investment in the required R&D - in the technology of capture, transport, injection, and sealing, and in geologic exploration for sites suitable for permanent storage - will be beyond the purview of any private interest.

So-called "geo-engineering" is another area of research that deserves attention, but will not receive it from the private sector. Some sunlight reaching the earth is absorbed, and some is reflected away. Likewise, some volcanic eruptions, namely those that produce lots of sulfur, can cool the earth significantly. Indeed, it is estimated that the sulfur currently in the atmosphere, mainly from combustion of coal and oil, may be masking a significant part of the expected greenhouse effect.

So it would make sense to conduct small, reversible experiments to determine what substances might be put at what altitude to reflect incoming energy, and to include the results in global climate models to ascertain where they would be most effective and benign. Needless to say, this is not a task for the private sector, and some international sponsorship might be appropriate.

For some, particularly the Bush administration, uncertainty regarding global warming appears to be a legitimate basis for postponing action, which is usually identified as "costly." But this idea is almost unique to climate change. In other areas of public policy, such as terrorism, nuclear proliferation, inflation, or vaccination, an "insurance" principle seems to prevail: if there is a sufficient likelihood of significant damage, we

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take some measured anticipatory action.

At the opposite extreme is what is often called the "precautionary" principle, now popular in the European Union: until something – for example, genetically modified foods – is guaranteed safe, it must be postponed indefinitely, despite substantial expected benefits. Neither of these two principles makes sense, economically or otherwise. We should weigh the costs, benefits, and probabilities as best as possible, and not be obsessed with extreme cases.

Of course, the uncertainties about climate change make a few actions infeasible for now, and probably for a long time. The acknowledged uncertainty about the "climate sensitivity" parameter implies that it makes no sense to decide now, through some multinational diplomatic process, what the ultimate ceiling on greenhouse gas concentrations must be, and then using this ceiling as a basis for allotting quotas to participating nations. But most issues concerning climate change are not so clear. The most terrifying possible consequence of global warming that has been identified is the 'collapse' of the West Antarctic Ice Sheet, which rests on the sea bottom and protrudes a kilometer or two above sea level. Unlike floating ice, which does nothing to the sea level when it melts, there is enough of this ice sheet above the surface that it could raise the sea level by something like 20 feet if it glaciated into the ocean, inundating coastal cities everywhere.

Estimates of the likelihood of the West Antarctic Ice Sheet's collapse, or the likely time of collapse, have varied for three decades. Recent studies of the effect of ocean temperature on the movement of ground-based ice sheets are not reassuring. In my reading of the latest research, the likelihood of collapse in this century is small – but uncertain.

In responding to such uncertainty, we should neither wait until the uncertainty has been completely resolved before we take action nor act as if it's certain until we have assurance that there's no danger. These two extremes are not the only alternatives.

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