

CLIMATE POLICY

Addressing Cross-Disciplinary Challenges and Solutions

SEMINAR SERIES

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MIT Joint Program on Science & Policy of Global Change
The Economic Challenges of Addressing
Climate Change

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Dickinson School of Law

Lewis Katz Building—Room 114

(New building— corner of Bigler Rd. and Services Rd., University Park
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Dr. Reilly is the Associate Director for Research in the Joint Program on the Science and Policy of Global Change and a Senior Lecturer in the Sloan School at MIT, with a Ph.D. (1983) and M.S. (1980) in economics from the University of Pennsylvania, and a BS (1978) from the University of Wisconsin. His research career has focused on the integrated assessment of climate change, including modeling of energy use, biofuels, and greenhouse gas emissions and climate's effects on agriculture including consideration of land use change. His work is published in over 150 articles, reports, and volume chapters. He has served in a variety of capacities on the Intergovernmental Panel on Climate Change, was the Co-Chair of the US National Agricultural Assessment on Climate Variability and Change, served on early committees in the Federal government that shaped the direction of the US Global Change Research Program, and on a wide range of advisory committees. Prior to joining MIT in 1998, he spent 15 years with the US Department of Agriculture's Economic Research Service, with prior service for the Pacific Northwest National Laboratory and the Institute for Energy Analysis, Oak Ridge Associated Universities. **SEE ABSTRACT NEXT PAGE**

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Addressing Cross-Disciplinary Challenges and Solutions

John Reilly, MIT

“The Economic Challenges of Addressing Climate Change”

ABSTRACT

Economists generally approach the climate change issue from a cost-benefit perspective. Ideally we would embed the various impacts of climate change on market and non-market activities into a general equilibrium model of the economy, valuing both market and non-market changes in a consistent manner. Such a model would also represent mitigation of greenhouse gases from combustion, waste, land use, and industrial processes. The model would then be solved for the level of mitigation where the combined cost of mitigation and damage from climate change was minimized. A general condition of such an approach is that marginal cost of mitigation (cost of the last ton of GHGs reduced) is equal to the marginal benefit (value of avoided damage from the last ton). While the approach is conceptually straightforward and simple models that purport to evaluate the optimal policy exist (e.g. prominently Bill Nordhaus's DICE model), there are a large number of practical issues that arise in carrying out such an effort. Among these are (1) the very long time horizon of the problem which requires a fully dynamic solution to the cost-benefit problem, (2) Intra- and inter-generational equity considerations implicit in the Pareto efficiency criterion for welfare maximization and the reality that the compensation assumed is unlikely to occur, (3) valuation of non-market goods especially so-called non-use values (4) rampant uncertainty and the existence of “deep” uncertainty where there are events and occurrences for which it is not possible to estimate a probability of occurrence, and (5) highly complex interactions among components of the bio-physical-human earth system. Climate change is not the only issue like this—threats from weapons of mass destruction, decisions about war and defense, security threats from terrorists, asteroid collisions with the earth, and other things of such nature have similar characteristics. We rarely directly confront such issues as a monetized probabilistic cost-benefit problem but thinking in those terms identifies some of the research questions that are relevant to decision making. These include: (1) What risks can we quantify in a probabilistic sense and can we speculate on the worst possible outcomes? (2) What linkages among complex systems exist and will these undermine imagined solutions or lead to a cascading set of problems? (3) What is the cost of an all-out effort to limit the increase of GHG concentrations and how much additional warming is unavoidable? (4) What are the equity implications of climate damages and mitigation actions and what mechanisms are there to address inequities? (5) Are there truly irreversible changes that have serious consequences and how can they be avoided? (6) What actions can limit or avoid damaging effects of climate change and what preparation can be made for unexpected and sudden change?