MAKING SENSE OF CLIMATE CHANGE IMPACTS

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How To Approach The Issue

It may be better in the long-run if we back off of the arguments about whether climate change will occur. We can look at climate change on the basis of a contingency analysis – doing some looking ahead to the future just in case it occurs. We do this in our everyday lives. Few of us expect our houses to burn down, yet most of us carry fire insurance. We argue little about whether our house will actually burn down or not. We just make a contingency plan in case it does.

What sort of forward thinking or contingency planning do we need to get under way to deal with impacts? First we need to try to understand the nature of the climate change impacts that may occur and then what the drivers of this change are likely to be. If we don't have some understanding of these, then we are not likely to be successful in coping. People tend to talk about climate change impacts and about mitigation strategies. With the first they infer adaptation, with the second they infer policies to reduce carbon emissions. But, what we are actually dealing with is the potential impacts of climate change (most of it in the future) and the very real impacts today of proposed mitigation strategies imposed on us by national policy.

Both the potential future impact of climate change and the impacts of mitigation strategies are important and need to be considered in parallel. Agriculture is a sector where the impacts of climate change itself are of primary importance. Sectors such as transportation, energy, and primary metals are likely to be more affected by mitigation/regulatory driven impacts than by the actual climate change itself.

Direct Climate Change Impacts

In agriculture there are several basic concerns about climate change in the Midwest and Upper Great Lakes region. We do not appear to be dealing with a potentially uniform change. More important for agriculture is the potential change of the gradient and of the seasonal relationships. The regional models (which, by the way, we believe are not very reliable) indicate a greater degree of warming in the North as compared with the South. In addition, the models indicate that there will be more warming in the winter than in the summer. If this is true, it poses a somewhat different set of problems for plant breeders and plant protection specialists than a uniform moderate warming everywhere. Pests are much more likely to winter over in contrast to being killed by the cold winters as they are today.

Figure 1: Tarnished plant bug, Lygus lineolaris, is a serious pest of alfalfa being grown for seed. Source: U.S. Department of Agriculture (USDA), photo by Scott Bauer.

An even greater challenge for agriculture may be posed by what the climatologists term "seasonal fuzziness." With the warming, spring will come a bit earlier and fall will come a bit later, but, more important, the seasonal demarcation may not be as distinct. There may be more chance of late frosts in the spring and early frosts in the fall. This poses a special problem for agriculture in our regions given the great advantage in getting corn and soybean crops planted early to capture the maximum insolation.

Why do we worry about this, and what is the equivalent of the insurance policy that we need to be thinking about? It takes time to develop frost or pest resistant varieties and pest control practices to meet challenges like those projected here. It will be in the best interests of the agricultural research establishment to have such possibilities in the back of their minds as they develop the research agenda for the coming decades. Private firms can approach this from the standpoint of determining how much they can afford to invest in new technology. A frost resistant corn variety able to deal with the seasonal fuzziness that might occur and still allow a farmer to get his crop in early might be worth up to a quarter of a farmer's net income as compared with the cost of frost loss that would otherwise occur. The contingency thinking mentality is especially critical for public agricultural research. Much of the adaptation that will not yield a clear profit will need to be spearheaded by the public sector to prevent or reduce the chance of food shortfalls.

Mitigation Impacts

Much of the early discussion in the U.S. of mitigation focused on utilities and heavy industry. Transportation was usually left out of the equation. Transportation accounts for about a third of our energy use with industry and utilities making up roughly another third and all other uses making up the final third. In OECD countries (Organization for Economic Cooperation and Development), transportation is a third of all CO_2 emissions and road freight traffic (much less efficient than rail) has tripled in the last 25 years. My suspicion is that the politics of dealing with reducing transportation emissions is much more difficult than the politics of regulating large industries or utilities that can be portrayed as the bad guys. Thus, politicians have avoided tackling this one head-on. In the U.S. our auto transportation is so driven by our geography and historical suburban settlement patterns that this will not be easy to modify. If vehicle populations and miles driven per year continue to increase as in the past, the imposition of the Sierra Club's recommended average fuel efficiency of 34 mpg for trucks and 43 mpg for cars starting now will still leave us 20% short the target of reducing CO_2 levels to those of 1990 by the year 2010.

Figure 2: Monroe Power Plant (fossil fuel), Lake Erie. Source: Center for Great Lakes Aquatic Sciences, April, 1986.

For the energy industry, coal, which is 43% of the electric generating capacity, actually provides 56% of the electricity and emits 88% of the CO_2. Under some of the regulations suggested, coal is dead. It's reprieve might come if the industry can perfect a technology to give efficiency levels similar to combined cycle turbines that run on natural gas. Some of the suggestions are to move to generation with natural gas. We now have a glut of natural gas, and it is clean and cheap. But, natural gas is our premium petrochemical building block for things from plastics to fertilizer to pharmaceuticals. Do we want to blow future generation's supply of this unique feedstock out the end of turbines to produce increasing amounts of electricity? To meet the 2010 objective of 1990 CO_2 emissions we will have to do more than change fuels. We will have to take a number of important steps: cut electricity load growth in half, cut heat rates 10%, shift 10% of the generation to natural gas, increase renewables share by 20% and increase transmission and distribution efficiency by 10%.

Actually Biting the Bullet

It all comes down to a willingness to take costs upon ourselves to deal with a broad public concern. As long as there is uncertainty about the event, there will be many unwilling to pay the costs of doing something. Thus, automobile drivers will not want to be forced by higher prices of gasoline to reduce fuel consumption. In March 1979 gasoline was $1.10 a gallon. In the summer of 1998 it was well below a dollar across the U.S. and the dollar is worth one third what it was in 1979. The fuel efficiency standards are the only reason we have the efficiency levels we do have in automobiles today. We are unwilling to use prices to encourage efficiency.

> "If you ask several sectors to take the easy and less expensive steps to control CO_2 emissions, it will be cheaper than asking one sector to take the full burden and climb up the increasing cost of getting decreasing amounts of CO_2 out of the system."

If we look at efforts to deal with climate change as an insurance premium or a contingency planning effort many people may be more willing to do something modest about it. The argument about whether it will happen and by how much is paralyzing. We need to be realistic about the costs. Piling all the costs on electric utilities or on heavy industry is perceived as saving the public from paying those costs – it only delays the bill a little. In addition, total costs will be lower if we get all sectors of the economy to contribute a little to the solution rather than put the full burden on one or two players. There is economic logic to this statement. For any sector to reduce CO_2 emissions, there are things that can be done initially at modest cost. To try to squeeze more and more CO_2 out of emissions costs more and more as the CO_2 producing industry proceeds up an increasing cost curve using more expensive technology.

What we might do is be as realistic as possible about the risk, treat our activities as insurance, and insist that all sectors (and countries) take at least those steps that are less expensive for them to take to slow the growth of CO_2. The environment for this will have to be one of regulatory stability so people can invest in change without fear of having the rules of the game change. Most everyone is going to have to be willing to pay something.