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Live Testimony of Ezra D. Hausman, Ph.D.

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My name is Ezra Hausman. My background is both in climate science and in energy market economics, so this topic is of particular interest to me. In fact, I have worked with a number of entities on issues of environmental regulation, including GHG emissions, and how it effects electricity markets. I will talk about some of this work in a few moments.

The written testimony that I have submitted to this committee is largely focused on the science of global climate change—why the vast majority of scientists are convinced that human activities are significantly, adversely and irreparably altering the global climate. I try to put current CO_2 levels in the context of climate history, which was my own area of scientific specialization, and I talk about why just about any human-induced climate change is likely to be harmful to our societies and our economies.

I don't think I need to convince anyone here of these facts, although I would be happy to try to answer questions in this area if it would be helpful. However, the one area I would like to reiterate and emphasize has to do with uncertainty.

You hear a lot about uncertainty in discussions of climate change, mostly from those who argue that the precision of the science is insufficient to justify immediate action. I agree that there is a lot that is poorly understood about how the climate behaves, but this fact does not give me comfort. In fact, as I see it, global climate models uniformly underestimate the potential for rapid, severe shifts in the climate system. When such effects appear, the models automatically dampen them out or reject those runs. Further, there may well be strong feedbacks in the climate system that are not represented in the models at all. A recent paper by James Hansen of NASA, which I reference in my testimony, details a few of these, especially the potential for rapid destabilization of ice sheets which would tend to strongly reinforce warming trends. This would also cause sea level to rise many times further and faster than most "gradual change" studies, such as the IPCC, predict.

As Hansen points out, climate history is much more consistent with the "rapid change" model than with gradual changes. The last 10,000 years or so, known as the Holocene, has not seen this sort of rapid, extreme fluctuations, but this is the exception in climate history and not the norm. Since we only have one planet and we know it is capable of great surprises, it seems to me that our ignorance should only reinforce our sense that action is needed, and soon.

As I mentioned earlier, I have worked on GHG mitigation strategies for energy markets in a number of contexts. Right now I am working with stakeholder groups (including the governor's offices) in both Colorado and South Carolina to develop GHG mitigation strategies in the electric sectors. While two states could not have more different political climates, they have both come to the realization that protecting the global climate requires immediate and real action.

We are considering a number of policies in each state, including various forms of energy efficiency measures, expanding the use of renewable energy, and a whole host of other measures. No one likes to recommend a tax, because no one wants to put an extra burden on consumers. But the fact is, the most direct and efficient way to achieve significant reductions in carbon emissions is to impose a marginal cost on every activity that produces them. This need not impose any net burden on the economy; indeed it can produce significant economic benefits by spurring innovation and creating new economic opportunities, and it can ultimately *lower* energy costs overall. A revenue neutral carbon tax, properly designed, could achieve these goals and significantly reduce carbon emissions in Massachusetts.

As unpopular as they are, taxes serve two important purposes: they raise money for the public good, and they provide financial incentives and disincentives that drive public behavior. Today there is little direct benefit to individuals for modifying economic behavior in response to the threat posed by climate change, because there is no direct financial disincentive felt by the individual or firm; all of the cost is borne by society as a whole. This is a classic example of the "tragedy of the commons"—the behavior of each individual imposes a net cost on society, but provides a net benefit for the individual. As a result the behavior continues to the detriment of the welfare of society. Taxes can provide a remedy for this situation by imposing a marginal cost on the individual that reflects the marginal cost on society, so that his or her economic incentives are better aligned with the social good. Note that what is important here is not the total cost, which need not be high. What is important is that the marginal cost of emissions, or the marginal benefit of reducing emissions, rest with the individual or firm taking action.

There are many, many ways to reduce carbon emissions without materially impacting quality of life in Massachusetts. In study after study, for example, energy efficiency is shown to be the least cost resource for meeting society's energy needs. Individuals can carpool or use public transportation to save gas. Buildings can be designed for energy efficiency and served by better insulation and more efficient lighting. Unfortunately, most people do not bother making these and similar adjustments, nor do our commercial entities invest anywhere near what they could in R&D for reducing energy use and greenhouse gas emissions.

This is because we do not have to pay the cost that our emissions impose on society, and so we do not make the decisions that would minimize that cost. A revenue neutral carbon tax is a reasonable response to that situation, providing an incentive to modify behavior in ways that would reduce carbon emissions without imposing a net burden on citizens of the Commonwealth. It would also be a powerful driver for innovation and technology,

providing opportunities for Massachusetts businesses to develop the technologies that will run the lower-carbon world of the future.

Of course, climate change is a global problem, and the ultimate solutions to greenhouse gas pollution will involve regulation at the federal level, and ultimately cooperation at the global level. But the solution has to start somewhere, and it has to start soon. Massachusetts can be a leader in literally saving the planet and develop economic opportunities in our state at the same time by developing and implementing visionary carbon policies such as a revenue neutral carbon tax.

Thank you for your time and attention.