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Hearing on
The Economics of Global Warming:
Shaping How US Companies are Doing Business

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My name is Dan Esty, and I am a professor at Yale University where I hold appointments in both the Law School and the School of Forestry and Environmental Studies. I am also the Director of the Yale Center for Environmental Law and Policy (www.yale.edu/envirocenter) and Co-Director of the Center for Business and the Environment at Yale (www.yale.edu/cbey). I would like to thank Congressman Larson, Chairman Markey, and the other members of the Select Committee for the opportunity to testify today. It is an honor to be here and share my thoughts on the economics of global warming – and on how American companies can turn our present energy and environmental challenges into opportunities. Our nation's success in responding to the issues you address today – finding a way to combat climate change and putting the United States on a course toward a Clean Energy future – will, in very fundamental ways, determine the health of our planet and our economy for generations to come.

I have been at Yale for 14 years, where my teaching and research center on "next generation" environmental policy, global environmental governance, corporate

environmental strategy, and "trade and environment" issues. Prior to my time at Yale, I spent nearly a decade in Washington in a variety of positions, including a four-year stint at the US Environmental Protection Agency, where I served as Special Assistant to EPA Administrator William Reilly, Deputy Chief of Staff, and Deputy Assistant Administrator for Policy. During that time, I helped to negotiate the 1992 UN Framework Convention on Climate Change, the environmental provisions of NAFTA, and various elements of the 1992 Rio Earth Summit.

Much of my work focuses on the business-environment interface. I have studied both how policy structures create (or fail to create) incentives to engage the private sector in addressing environmental harms and why environmental protection and related energy issues have become core elements of business strategy. My recent book, ***Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage***, shows why corporate leaders have come to recognize that environmental thinking in general and a focus on climate change in particular can be sources of competitive advantage in the marketplace. The research for this volume involved interviews with hundreds of corporate executives and dozens of companies across the United States and around the world – and provides the underpinning for my testimony today.

Overview

I want to stress three major points in my testimony:

1. There has been a sea change in business attitudes towards the environment and climate change over the last several years. Smart executives have come to understand that environmental issues (including the challenge of

reducing greenhouse gas emissions) are not simply about regulations to follow, costs to bear, and risks to manage. They also offer important "upside" opportunities. Specifically, companies that are able to position themselves as "solutions providers" are going to profit handsomely from society's increased investment in responses to climate change and other environmental challenges.

2. The key to progress on environmental issues generally and climate change specifically lies with adopting an innovation-oriented approach to regulation. This means using policy tools to create incentives that engage business leaders in technology development and the search for improved energy efficiency, alternative sources of energy, increased resource productivity, and the possibility of carbon capture and storage. Policies that promote a large-scale private sector commitment of resources and effort to a diverse set of technology solutions in the climate change arena are essential. Harnessing the abundant creativity of our country's scientists, innovative thinkers, entrepreneurs, and venture capitalists is the key to societal progress in reducing greenhouse gas emissions. Innovation and technology development lie at the heart of not only a successful response to global warming but also to the renewed vitality of the US economy and our continued competitive position in the world.

3. The need to engage the private sector to maximize technology development and innovation in response to climate change does not mean that the government has no role to play. Quite to the contrary, our

lawmaking and regulations must be even more carefully designed to ensure that our policy framework has an appropriate portfolio of incentives in place to drive the innovation process and maintain US competitiveness.

I will elaborate on each of these three core points in the testimony that follows.

Business's New Attitude Toward the Environment

Business attitudes toward the environment have shifted dramatically in recent years away from thinking about climate change as merely a burden. A growing number of companies recognize that investments in eco-efficiency reduce operating costs and pay quick dividends. With oil prices at record high levels, the payback period for investments in "green buildings" (more efficient lighting, windows, insulation, heating, and air-conditioning) has never been shorter. Companies can also save money and improve their competitive position by lowering their energy consumption through more sophisticated approaches to distribution, warehousing, and logistics – and particularly by bringing information technologies to bear on environmental problems.

Business leaders are stepping up to these opportunities. UPS has used onboard navigation systems to dramatically reduce the number of left turns its drivers make – cutting 28 million miles from their routes, saving the company over 3 million gallons of gas, and reducing their greenhouse gas emissions by over 25,000 metric tons.[1] Likewise, DuPont has cut its contribution to global warming over the past decade by an astounding

[1] Daniel C. Esty and Andrew S. Winston, *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage*. (Yale University Press, 2006), 106. Emissions factor from Environmental Protection Agency. "Greenhouse Gas Equivalencies Calculator," Environmental Protection Agency, http://www.epa.gov/cleanenergy/energy-resources/calculator.html

72 percent, and CEO Chad Holliday's emphasis on greenhouse gas emissions reduction has saved the company an estimated $2 billion over this period.[2] IBM offers another example of corporate leadership on climate change that has delivered both environmental and economic dividends. The company redesigned its heating and cooling systems to be more energy efficient and ended up saving $155 million per year, as well as dramatically cutting its greenhouse gas emissions.[3] Staples similarly saved $6 million in two years with centralized controls for lighting, heating, and cooling at its 1,500 stores.[4]

The range of internal strategies that companies have used to identify opportunities for increased energy efficiency is truly impressive. BP discovered $1.5 billion in savings by putting a shadow price on greenhouse gas emissions and internally trading emissions among its business units. Besides saving money, the company's experience helped it to refine its policy knowledge, positioning BP to shape the United Kingdom and EU emissions trading systems. As Lord John Brown, then BP's CEO, observed, getting ahead of the curve meant the company got "a seat at the table and a chance to influence future rules."[5] While many companies have come to appreciate the value of eco-efficiency in the context of high energy prices, the truly leading companies recognize that the real opportunity for competitive gain in the marketplace comes from helping to solve the energy crisis facing their customers. Two of the leading companies in this regard are headquartered in Connecticut and are represented here today: General Electric and United Technologies.

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[2] Esty and Winston, 105.
[3] *Ibid.,* 106
[4] *Ibid.,* 109
[5] *Ibid.,* 120

Jeff Immelt, CEO of GE, is fond of saying, "green is green." As I am sure my co-panelist John Rice of GE will explain, the company has invested in an extraordinary array of "ecomagination" goods and services – ranging from high efficiency locomotives and jet engines to wind and solar power – positioning the company as a leader in the climate change solutions marketplace.

Likewise, George David of UTC added billions of dollars of value to his company's market capitalization by developing and selling goods and services that provide eco-efficiency to the company's customers. From energy efficient air conditioners and elevators to cutting-edge fuel cells, UTC has worked to break new ground in a variety of areas that will be critical to our country's response to climate change.

The shift to a carbon-constrained world will undoubtedly mean a degree of upheaval in the marketplace. As with any dynamic situation, there will be losers as well as winners. Companies that are focused on the changing requirements of their customers, particularly the need for every business and every household in the country to become more energy efficient, can expect success and profitability in the months and years ahead.

Companies that do not see the strategic imperative that arises with society's efforts to respond to climate change face potentially significant challenges. The US auto industry offers a case-in-point. While Detroit only recently began to factor environmental concerns into core business strategy, Toyota developed a sophisticated hybrid engine and reengineered its entire fleet to take advantage of fuel efficiency improvements, including "lightweighting" its cars through the use of carbon fiber and other advanced materials as well as developing "smart systems" that deploy computer power to reduce the energy

draw of everything from the stereo to the ignition.[6] The lesson here is clear: companies must be strategic in their efforts to bring an environmental lens to their business operations. Those who do this in a systematic, comprehensive, and analytically rigorous fashion have every reason to expect a strengthened position in the marketplace. Those who are more haphazard or, worse yet, fail to see the green wave sweeping across society, are at real risk.

This green wave represents, of course, not only an opportunity for businesses, but also a chance for society in general to shift toward a Clean Energy future. From the earliest days of the Industrial Revolution, innovation drove America's prosperity. Our economy flourished as a result of technological innovations such as New Haven–based Eli Whitney's cotton gin, which increased labor productivity by a factor of ten. Our economy will have to undergo a similar transition by increasing our *carbon productivity* ($GDP per ton of carbon emissions) by a factor of ten in the next 40 years to meet the necessary emissions targets agreed upon by climate scientists to avoid dangerous climate change. [7] While this may seem like a daunting challenge, the technological innovation required to respond to climate change can put us on a course toward independence from foreign oil (and the related wealth transfer of $700 billion per year), reduced dependence on energy supplied from unstable regions of the worlds such as the Middle East, and new sources of energy that ultimately promise lower costs and greater prosperity.

Toward an Innovation-Centered Environmental Policy

[6] Esty and Winston, 133.
[7] McKinsey & Company. McKinsey Global Institute. *Carbon Productivity Challenge: Curbing Climate Change and Sustaining Economic Growth*, (June 2008).

America's economic strength has long been a function of our creativity, willingness to experiment, and technological development. Twenty years in the environmental arena have convinced me that we owe our success in responding to pollution control and natural resource management challenges to our capacity for innovation. For many years, America led the world in environmental technology development. In more recent years, we have lost ground in this regard to companies in both Europe and Asia, where the spur of demanding regulatory standards has helped sharpen the private sector's environmental focus.[8]

Historically, America has not only been a leader in technology development but also in policy innovation. The European Union's greenhouse gas emissions trading system builds on the sulfur dioxide allowance trading that the United States advanced to respond to the problem of acid rain in the early 1990s. We also led the way in using "harm charges" that create incentives for companies to avoid environmentally damaging behavior – such as the fees put on ozone-layer-damaging chlorofluorocarbons (CFCs). This pricing structure helped move American companies out of CFC production ahead of the schedule set by international treaties and at much lower cost than anticipated.

The key to innovation is to draw the private sector into the search for solutions. While government has an important role to play where the risks are too high or the payoffs too distant to engage companies, the bulk of the effort to produce the innovations needed to respond to climate change must come from the business world. When faced with the right incentives, American companies have a nearly unbounded capacity for creativity. From our largest companies to garage-based solo innovators, the history of our

[8] Michael E. Porter, "America's Green Strategy." *Scientific American,* 264 no. 4 (1991), 168.

country is replete with stories of successful entrepreneurs contributing important breakthroughs that have helped remake our society and the broader world.

To maximize innovation, we need to encourage the largest possible scale of investment in the "clean tech" marketplace. Simultaneously, we want to promote the greatest diversity of thinking about where breakthroughs might be found. As I noted earlier, the government has a critical role to play in establishing the policy framework that encourages both the appropriate scale and diversity of investments.

The good news is that venture capitalists and other investors have plowed billions of dollars into companies working on breakthroughs in improved energy efficiency, reduced greenhouse gas emissions, better resource productivity, and alternative sources of energy. Additionally, the private sector has placed a number of "side bets" on the prospect of being able to capture carbon dioxide and store it for many centuries, preventing it from causing climate change.

Estimates suggest that worldwide investment in the clean tech marketplace last year topped $100 billion.[9] But the continued commitment of resources to this technology development arena depends on the promise of a payoff for successful innovators. Government must ensure that the incentives are in place to promote the continued flow of resources into building a Clean Energy economy – rather than into programming new video games or other less socially productive investments.

Keeping the United States Competitive

[9] New Energy Finance, "Welcome to New Energy Finance," New Energy Finance, http://www.newenergyfinance.com

Historic foundations for competitiveness relied upon access to low-cost natural resources or labor. In today's world, competitive advantage comes from innovation and the capacity to make each hour of work return high-productivity results. The United States should be at the very forefront of this process. Indeed, what Saudi Arabia is to oil, the United States of America is to innovation.

We are poised to transform our role from being a major contributor to climate change to emerging as the world's leading solutions provider. But to do so we will have to restructure our environment and energy policy frameworks. Fundamentally, we have an unmatched research and development capacity. In 2007, the World Economic Forum ranked the United States as the most competitive and innovative economy in the world. Innovation is our comparative advantage, but government policies must be designed to promote clean tech breakthroughs. Putting a price on carbon is a start – a necessary but not a sufficient step.

The precise form that the price signal related to climate change takes is less important than getting a framework of incentives in place that provides a steadily increasing logic for investments in greenhouse gas emissions control. While a "cap and trade" system of allowances seems likely to have the most traction in our political process, I believe a broader portfolio of incentives should be adopted. We need clear and broad signals to every company – and for that matter every citizen – that any activity that leads to the release of greenhouse gas emissions will bear a price for the harm it causes. In some cases, our best approach will likely be old-style government mandates. For example, we should move quickly to adopt green building standards that push energy efficiency forward in our homes, offices, and factories.

Government agencies at all levels should reexamine their regulatory frameworks, approval processes for environmentally friendly technologies, and purchasing practices. Already, the FDA's endorsement of post-consumer recycled material in Starbucks coffee cups and the FAA's allowance of continuous-descent arrivals (to lower aircraft fuel consumption during landing) in four major cities have helped companies reduce greenhouse gas emissions.[10] Public procurement can help jumpstart the market for innovations.[11] And the public utility commissions in each state need to align the incentives of utilities with our national climate change goals, paying electric generators for the services they provide (including energy efficiency), not just the sheer quantity of kilowatts they produce.

Information is also a powerful policy tool. Databases such as the EPA's Toxic Release Inventory and voluntary programs such as the Energy Star Program have produced positive results in reducing toxic compound release and conserving energy without any federal mandate.[12] We must also take advantage of the Internet and other information dissemination tools to spread the word about best practices in energy efficiency at the state, community, company, and household levels.

Let me offer, if I may, a few words on what the government should *not* do. Most critically, the government must refrain from choosing "winning" technologies. Anyone with an innovative idea should be allowed to pursue it. The government should simply "level the playing field" – putting all energy options on equal footing by ending the past practice of subsidizing fossil fuels and nuclear power.

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[10] Environmental Defense Fund. *Innovations Review,* (2008) www.edf.org/InnovationsReview.
[11] European Commission. Institute for Environmental Studies. *Innovation Dynamics Induced by Environmental Policy: Final Report,* (November 2006).
[12] Environmental Protection Agency. National Advisory Council for Environmental Policy and Technology. *EPA and the Venture Capital Community: Building Bridges to Commercialize Technology*, (April 2008).

The US needs to move *quickly* toward this innovation-centered policy focus, not just for environmental reasons but for economic ones as well. Our economic strength and future competitiveness depend on the United States leading the way to a Clean Energy future. Should we fail to step up, others will. Just last week Abu Dhabi launched a massive new development aimed at creating a world-class clean tech R&D center.

Perhaps most importantly, we need leadership that galvanizes the American public – Republicans and Democrats, young and old, and citizens in every state. Likewise, we must mobilize the entire American business community – old-line manufacturing companies as well as high-tech industries and service providers, small businesses as well as big. Changing our nation's energy trajectory demands policies that are bold yet carefully crafted and sensitive to our competitive position.

Conclusion

We stand at a watershed moment with regard to climate change and environmental policy more generally. The international community will not succeed in responding to the threat of global warming and the related risks of sea level rise, changed rainfall patterns, and more intense hurricanes and other windstorms unless the United States steps up to global leadership. Historically, the international community has been able to respond to global-scale environmental challenges, such as the risk to the ozone layer from CFCs, only when the United States leads the worldwide policy process toward an effective, economically sensible, and equitable outcome.

We cannot shy away from the present challenge. The American public stands ready for change. Poll after poll reveals a citizenry that wants a serious response to the

threat of climate change, freedom from foreign oil, reduced exposure to fossil-fuel-caused local air pollution, and real competition in energy markets where renewable sources of fuel and power drive down prices.

The business community is ready to play its role. Indeed, the US Climate Action Partnership has dozens of leading companies behind it – signaling their commitment to being part of the solution to climate change and willingness to accept mandatory greenhouse gas emissions controls. The smart companies now see the opportunity to be providers of environmental goods and services and to help move us toward a Clean Energy future.

Similarly, policymakers should recognize that the climate change challenge is also an opportunity. It offers the chance to shift our environmental protection efforts toward an approach that spurs innovation by ensuring that those who cause harms pay for the damage they produce. In putting a price on pollution, we can reward those all across this country (and the world) who dig into the opportunities that can be found in a hundred different directions to improve energy efficiency, reduce emissions, and find new fuels as well as carbon-free ways to generate electricity.

Moving to engage seriously in the process of addressing climate change is not just an environmental imperative; it is an economic one as well. America can be the leading nation in the world when it comes to the new Clean Energy economy. But we will not get there if we rest on our laurels. We need a policy structure that engages every segment of society in remaking our energy infrastructure and revitalizing our economy. Our competitiveness and the prosperity that we seek for our children and grandchildren depend upon it.

Thank you very much.