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“Climate Change and New York: The Need for Quick Scale in Policy Solutions.”

Thanks. I am honored to be here with such great speakers. NYSERDA is a great agency. I’m always happy to give your money to others.

The focus today is on climate. While much basic R & D is still needed, the first priority must be how to get known technologies deployed quickly at scale.

I. The Climate Change Challenge

Let me focus first on climate change or global warming. We now tend to use the two terms interchangeably since global warming is better known but climate change is more accurate. The changed climate will bring not just warming, but more flooding, more droughts, stronger storms, more severe heat waves, and sea level rise.

We are well past the time to debate the science of climate change. Scientists tell us that we have about an eight year window, maybe less, to start making meaningful and ever more stringent reductions in greenhouse gas emissions to avert the worst, most catastrophic harms.

The Intergovernmental Panel on Climate Change – the body which just won the Nobel Peace prize for its authoritative scientific work on climate change – usually gives ranges in their predictions. We’re now seeing where in that range we are. A study published just last week has determined that carbon dioxide increases in the Earth’s atmosphere are at the very highest end of scientists’ predictions. Between 2000 and 2006, the level of CO₂ in the atmosphere grew at the fastest rate ever since recording began. Total atmospheric CO₂ now stands at 381 ppm, which is about 30% higher than pre-industrial levels and higher than even in hundreds of thousands of years. The IPCC hopes that the harms of climate change will be "manageable" if we stabilize atmospheric concentrations at around 450 ppm.¹

We are already seeing the impacts of climate change now, and they are severe. Arctic sea ice receded to its lowest level in recorded history just this September. Last year was the hottest year on record. All 10 of the hottest years on record have

¹ It should be noted that the 450 ppm is really a CO₂e target, not just a CO₂ target. Non-CO₂ greenhouse gases add about 50 ppm equivalent forcing at present, which is largely offset by the shielding effect of aerosols.

occurred since 1990. Glaciers and snow packs are receding. That's part of the reason that global warming is not merely an issue of scientific interest, but one of survival for many communities whose land will be desertified (sub-Saharan) or flooded (Bangladesh). Let's remember that it was a peace prize that the IPCC won.

It is frustrating to consider how close we are to certain ecological tipping points, which can trigger abrupt climate change or make permanent drastic environmental change. What had been stable becomes more like a vicious spiral. One such tipping point concerns the summer Arctic sea ice you see here. Ice reflects light, but sea water absorbs it, and instead warms. Thus as the sea ice recedes more each summer, the planet's own defenses against overheating are being reduced and the impact of our CO₂ emissions is even greater.

There are many other negative feedbacks. As the vast frozen areas of Siberia, Canada, and Alaska warm, CO₂ and methane – up to now frozen – are released in vast quantities, adding fuel to the climate change fire. Studies also show that the natural carbon sinks of soils, forests, and oceans, which absorb CO₂ and prevent it from entering the atmosphere, and thus slow global warming, are becoming saturated so that atmospheric levels of CO₂ will rise faster – as we are seeing.

All of this science sends a clear message. We are in an extremely urgent situation. [Most important: peace, health, spirit, and economics.] We must act now, we must be bold in our thinking, and we must implement solutions that maximize transformative change across entire energy systems, entire economies, and entire countries.

While this federal administration is still arguing for half-hearted voluntary measures to combat global warming, almost all other serious voices see the need for much more action.

- We see the need to stop any additional investment in carbon-intensive energy technologies such as pulverized coal-fired power plants and sprawling development.
- We see the need for a price on carbon, accomplished through a long-term declining mandatory cap on carbon emissions that covers all sectors of the economy and requires that polluters pay to pollute our atmosphere.

- And we see the need for complementary performance standards to make buildings, fuels, vehicles, appliances, and electricity more efficient and cleaner.

New York and many other states are not waiting for federal action. [**SLIDE - Rising Tide 2007**]

- 19 states have adopted hard caps on carbon for some portion or all of their economy, mostly recently Florida and Minnesota.
- Just today 10 Midwestern states agreed to set greenhouse gas targets, employ cap and trade systems, and take other carbon reduction measures.
- Another 11 states are seriously considering such action.
- A different 15 states have adopted the California vehicle greenhouse gas emission standards, which were recently upheld by a federal court in Vermont with help from the New York Attorney General's Office.
- 14 states sued the federal government to address CO2 pollution from motor vehicles and in April we won in the U.S. Supreme Court.

All of this action at the state level has happened incredibly quickly. Here's where we were just about one year ago. [**SLIDE – Rising Tide 2006**] Here's where we were not quite two years ago. [**SLIDE – Rising Tide 2005**]

Cities also are not waiting for federal action. Just a few months ago, Tulsa, Oklahoma became the 500th city to sign the US Mayors Climate Protection Agreement. The current total stands at 691 mayors.

Even corporations are pushing the White House to take action. In January, a group of 4 NGOs, including NRDC, plus 10 major U.S. companies, including GE, Alcoa, and Caterpillar, joined in the U.S. Climate Action Partnership, or U.S. CAP. That group, which has now grown to include 6 NGOs and 27 major corporations (and one of the newest members is Exelon, a major electric utility), urges mandatory CO2 emission reductions of 10-30 percent by 2030 and 60-80 percent by 2050.

And the public is tired of waiting. Over 60% view climate change as a serious problem and want a carbon cap. Over 90% want increased efficiency standards for vehicles, appliances, and the like.

So the short of it is that you will see climate legislation. It may not come before 2009, but it will certainly come soon thereafter.

I will not get into the details of all these different global warming bills here, but note that they all provide for dramatic cuts from business as usual. Few provide for all that's needed, but we need to start now.

Your role in achieving these reductions – reductions necessary to save us from really very extensive harms from vastly different weather patterns – is critical.

II. New York's Role in Solving Climate Change

You know that our economy is based on carbon. We heat our homes with carbon-rich fuels, we generate our power through carbon-rich fuels, and we run our cars on carbon-rich fuels. And so we emit CO₂ from many different sources, from many different sectors of our economy, and from many different kinds of technologies.

What this means is that there is no one way to solve climate change. There is no single “silver bullet” solution. Instead, we need to take the “silver buckshot” approach of seeking CO₂ emission reductions across a range of sectors and technologies.

A recent analysis of greenhouse gas abatement opportunities by McKinsey and others examined the many possible ways to abate, or reduce, CO₂ emissions – notably, energy efficiency measures with buildings and fuel efficiency measures with vehicles have the potential to provide significant net benefits right now.

As this second McKinsey slide shows, we will need to employ many different CO₂ reducing measures if we are to achieve the 25-30 gigatons per year of CO₂ reductions necessary to stabilize atmospheric CO₂ at or below the critical 450 ppm threshold identified by the IPPC.

A. New York as Clean Energy Investment Magnet

New York can play a critical role in helping low- or no-carbon technologies come to fruition by striving even harder to become a magnet for clean energy research and development.

Now is the moment. Incredible economic benefits are at stake. Private investment in clean energy is skyrocketing. A recent report from the United Nations Environmental Programme on renewable energy revealed some very promising investment trends:

- Sustainable energy investment was \$70.9 billion in 2006, an increase of 43% over 2005. The upward trend continues in 2007, with \$85 billion forecast for the year.
- Government and corporate R&D increased by 25% to \$16.3 billion in 2006.
- The U.S. is the largest single destination globally for venture capital and private equity investment. In 2006, such investors poured \$4.9 billion of new money into clean energy companies and projects in the U.S.
- Sectors with the highest levels of investment in 2006 were wind (38% of total investment), biofuels (26%), and solar (16%), reflecting technology maturity, policy incentives, and investor appetite.

New York should try to capture as much of this clean energy investment wave as it can. State agencies like NYSERDA can help attract private investment by actively inviting and encouraging companies to site their demonstration projects here – such as pilot projects for CCS (both geologic and perhaps offshore), for non-corn biofuels, for offshore wind, and for concentrated solar and PV. These kinds of demonstration projects will happen with or without New York. For instance, BP this year announced a \$500 million grant to the University of Illinois for cellulosic ethanol research. Why couldn't SUNY have gotten that?

We should always be thinking of creative ways to allow this kind of technology innovation to happen right here. NYSERDA's Saratoga Technology and Energy Park (STEP), which is currently under construction and will eventually house the Department of Environmental Conservation's Alternative Fuel Vehicle Research Laboratory, as well as other private endeavors, is a very promising step forward. New York should call up the CEO of any company in this field and invite them to

do any American pilot project here. Don't wait for them to come here – go get them.

B. New York as Leader in Low-Carbon Energy Deployment

New York can also play a crucial role in the climate change fight by finding the barriers to implementation of low-carbon energy technologies and then finding ways to overcome them.

In part, this means making sure not to view technology in isolation from the real world. Thinking about how to deliver new technology to users is just as critical as researching that technology in the first place. People and companies need to have the right information so that they know to choose the most low-carbon, energy efficient technologies on the market. There need to be companies and contractors qualified to install it. Thus NYSERDA and other state agencies need to be actively promoting new technologies to businesses and the public to build demand. NYSERDA need to look into training and certification programs, and to provide incentives for people to learn the skills. This builds supply. People need to know how to get their homes better insulated, for instance. Or how to get geothermal or solar energy into their homes. And there need to be people who can do it. This is the challenge of making the theoretical, the real, and while it may not be glamorous, it is an absolutely crucial task.

Let me put this another way. I'm speaking to the choir here. We all agree. Looking at polling and also at membership in environmental groups, we see the choir is small. Maybe 10 million who are really green. Maybe 50 million. But there are 300 million in the U.S. Ask your neighbor or your cousin in Indiana. Get out there.

And now let me put this yet another way. Look back to this. All these “negative cost” opportunities. If they save money, why aren't they already being done? Well, the market works well for some things, but it doesn't work well for efficiency or clean energy. Pollution has no price; people don't have or trust information as to lifetime impacts and savings; people expect ridiculously fast returns on investment (compare 30 year house to 3 year efficiency pay back). Research includes not just technical research, but research into market failures, and how to overcome them.

Technical research is also key.

When we think about how to solve the challenge of climate change, we often think about that challenge in terms of a CO2 emissions “pie.” Three of the biggest “slices” are CO2 emissions from buildings, from electricity generation, and from transportation. For each, there are promising low-carbon technologies that could make real reductions if we could figure out how to quickly get them up to scale.

Let’s take buildings. Residential and commercial buildings combined are responsible for approximately 27% of all CO2 emissions in the United States (as end-users of energy). Some comes from appliances, the rest comes from the heating and cooling of those buildings. Geothermal power is a sustainable, low-carbon source of energy that could potentially satisfy a great deal of those heating and cooling needs. Geothermal power is especially well suited for large commercial or industrial buildings, also schools.

NYSERDA has some incentives programs for geothermal adoption by commercial and industrial buildings, but currently no program of incentives exists for residential homeowners. That needs to change. NYSERDA should also research the technical possibilities, as well as the environmental impacts, of establishing a standard for commercial developments of a certain size that would require geothermal power for that development.

The biggest slice of the CO2 emissions pie in the U.S. comes from transportation – about 33%. Autos, trucks, and aircraft are responsible for the overwhelming share of that – more than 90%. It’s clear that if we want to achieve the major cuts in emissions our entire economy needs, the transportation sector must play a key role.

To reduce emissions in this sector, we generally look to three policies – increased efficiency of vehicles, reduced carbon content of fuels (largely through an increase in biofuels), and reduced vehicle miles traveled, or VMT. I want to focus briefly on the last two.

First, low carbon fuels, or biofuels. Significant CO2 reduction gains could potentially be made here. Right now, a gallon of corn ethanol reduces global warming pollution by 18% for every gallon of gasoline displaced. Newer, more efficient corn ethanol processing methods can increase that to 35-45%. But these are just temporary solutions; we’re on the road to other biofuels, such as cellulosic ethanol.

Most forms of biofuels, however, can have significant environment impacts – water, pesticides, and forest loss. The key here is that NYSERDA’s biofuels research must consider the entire lifecycle of biofuels. Private business will focus on the technology.

It is important that NYSERDA not pick a biofuel winner, but rather that it assess the entire range of biofuel possibilities with an eye towards developing a state-wide low carbon fuels standard and state-wide regulations for the production of biofuels. NYSERDA’s biofuels research can play a key role in learning how to both minimize environmental impacts and maximize CO2 abatement.

Vehicle miles traveled, or VMT, is another promising area for the state’s researchers. Americans, and New Yorkers, drive a lot. In 2006, we drove 3 trillion miles. That’s already too much. And the trends are all in the wrong direction:

- VMT has grown 3 times faster than population growth since 1980. It has grown at about 3.6%/yr, so that congestion delays have grown over 7%/yr.
- Now many Americans spend more time commuting than vacationing.
- And it will get worse; VMT is expected to grow by 59% by 2030 and it is estimated that we will drive 7 trillion miles per year by 2035.
- Thus, even if we increase fuel economy to 35 mpg and decrease the carbon content of fuel by 10% (the target in California), with that increase in VMT, transportation related CO2 would increase 12% from current levels.
- But we need this sector to achieve a decrease of 30% from current levels.

Research on how to reduce VMT is needed on many fronts and I’ll only mention a few. We need to research how best to design our neighborhoods, suburbs, towns and cities, old and new, so that people are encouraged, and motivated, to get out of their cars and walk, bike, or use public transit instead. We also need to research how New York can best manage traffic flows and traffic congestion so that cars are traveling as efficiently and as minimally as possible. (Although this is not strictly a VMT issue, we also need more research on the energy efficiency possibilities within rail transportation itself. The MTA in New York City, for instance, will be switching its steel third rails with aluminum third rails because the aluminum can

more efficiently carry the electricity that powers the subways.) These may be new areas for research, but they are critical.

Electricity generation is the last big slice of the CO2 emissions pie that I want to mention. There are a number of promising research avenues in this vein, but you've already heard some, so I'll only mention two.

- Grid research: We need research on how to best handle the variable power provided by renewable sources – solar and wind, in particular – within the constraints of our grid. A better understanding of how to control variable power through an intelligent grid will help us accelerate the installation of renewable energy at greater capacities and also allow us to greatly expand our solar net metering program in New York. We also need a renewed emphasis on grid efficiency. One Texas energy company owner I spoke with told me about how he was able to increase grid efficiency by 10% by using better sensors that allowed his company to identify the most inefficient transformers in the grid and then replace them with more efficient ones. NYSERDA's own Albany High-Temperature Superconductor Cable Project, which has been running since 2006, is a great example of grid efficiency research. NYSERDA should now be pushing hard to figure out how to replicate the Albany line project elsewhere in the state as quickly as possible.
- We also need to increase our research focus on wind power siting issues, particularly for large offshore facilities. These are often controversial and poorly understood by the public, but they are needed and could generate large amounts of much needed renewable energy. NYSERDA's generic wind impact study is terrific, but it must be brought to fruition so wind can go from theory to reality.

In sum, the time for action is now. We need to deploy technologies now. We need to find the barriers and break them.