The New York Academy of Sciences
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SEP Comments
NYSERDA
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To the New York State Energy Planning Board:

Enclosed please find written testimony on the New York State Energy Plan from the New York Academy of Sciences. It complements the oral testimony presented at Brooklyn College on September 10, 2009.

Thank you for the opportunity to participate in this process. We appreciate the inclusion of many of our ideas in the draft Plan and look forward to the final version.

With best regards,

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Karin Ezbiansky Pavese, PhD
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September 10th, 2009
Testimony

Thank you for the opportunity to participate in today's hearing. We wanted to begin by applauding your effort and work on the New York State Energy Plan. Establishing critical buy-in across the energy sector's stakeholders and aligning them behind one comprehensive energy strategy for the State is important and commendable.

As was mentioned, I currently run the Innovation & Sustainability Program at the New York Academy of Sciences. Since the Academy's inception in 1817 it has been a keystone to New York's scientific community while living out its mission to advance scientific knowledge, help resolve major global challenges of society with science-based solutions, and increase the number of scientifically informed individuals.

The Academy has a long history of providing a forum for discussion about the intersection of environmental issues with science, technology, business, and government. Clearly, science and engineering are critical to meeting many of the environmental challenges facing us today.

These technological challenges are numerous and apparent: improvements in batteries, biofuel-burning engines, wind power, and fuel cells for vehicles; higher efficiency electricity transmission lines; building materials that weigh less and insulate more; and new types of appliances and lighting that consume less electricity. As the significance of these challenges continues to grow, so will the need to understand and develop the science and technology behind them.

However, the great science and technology that is in such demand worldwide will not develop spontaneously. It will only happen within an innovation-friendly environment. Therefore, in addition to a focus on science and technology, fostering innovation should be given equal priority. A framework that is often used to describe innovation systems emphasizes the importance of a diverse array of key inputs such as human capital, research and development funding, early stage, angel, and venture capital, as well as a strong industrial base, all of which must be linked through robust interdisciplinary and global collaborations. Although our New York headquarters figures prominently in our name, we are a global organization and strongly encourage international partnerships; building these partnerships is an important facet of our work toward helping to promote technology advancement and innovation. Only by thinking globally and incorporating these innovation concepts into the State's strategic planning do we feel that the State's efforts will yield maximum technological and economic benefits and serve as a hub for the global community.

On this topic we were thrilled to see Chapter 5, *Stimulate Innovation in the Clean Energy Economy*, included in the State Energy Plan.

The State has many important energy assets that encompass the innovation elements described above.

To name just a few:

NY-BEST: Initiated by the Governor's Office and managed by NYSERDA, the New York Battery and Energy Storage Technology (NY-BEST) Consortium was created to move energy storage research toward development and commercialization. Its strong industry focus ensures that its funding and equipment allocations are directed toward translational research likely to yield significant economic gains. The initial State investment is meant to support what will become a self-sustaining cluster of advanced energy storage research and manufacturing in New York.

STEP: The Saratoga Technology + Energy Park (STEP) is a fully integrated knowledge community for clean technology and environmental companies. By concentrating related businesses, STEP fosters collaboration – not only within industry, but also among universities and research centers that view STEP as a clean technology destination. In the eight years since its founding, STEP has attracted an impressive array of cleantech companies, both new and established, with focus areas ranging from cleaner oil refineries to semiconductor manufacturing. Hudson Valley Community College is building a facility at STEP to train its students, which will both strengthen the region's cleantech workforce and increase the economic benefits of STEP to the community and the State.

Cleantech Incubators: NYSERDA is funding six new incubators, which are anticipated to play a key role in helping to transition new technologies to the marketplace by providing support infrastructure for early stage cleantech businesses and entrepreneurs. Services offered will include marketing and sales support, business counseling, technical assistance, and professional networking opportunities.

Regional Greenhouse Gas Initiative (RGGI): This is the first mandatory cap-and-trade program in the United States to reduce greenhouse gas emissions. Regulated power plants can use a CO_2 allowance issued by any of the ten participating states to demonstrate compliance with an individual state program. In this manner, the ten state programs, in aggregate, function as a single regional compliance market for CO_2 emissions. Not only does this initiative create market pull for new technologies, but it is also an example of taking a regional approach that transcends State boundaries.

Task Force on Diversifying the New York State Economy through Industry-Higher Education Partnerships: Public-private partnerships (PPP's) and, specifically, industry-academic partnerships help to align academic research with market needs, increasing economic output. These partnerships, combined with partnerships with government, can be especially critical as technologies cross the "Valley of Death" – which follows university funded basic research – and climb the so-called "Mountain of Death" – which follows the prototyping phase of development but precedes industry-funded commercial plants. Past research and experience has demonstrated that these partnerships are most

effective when there is a shared vision and clear expectation for what the partnership will accomplish; a strategic, long-term commitment—especially for universities that struggle with long-term revenue streams; and support from scientists and political and industry leadership. The Governor's recent creation of this task force should help drive successful partnership formation in the State.

The Smart Grid Consortium: Building on this theme of PPP's, The Smart Grid Consortium was founded in 2008 representing a key public-private partnership to promote broad statewide implementation of the smart grid.

On this topic, we would be remised if we did not highlight that NYSERDA, in many cases, is responsible for helping to create and implement many of these initiatives. NYSERDA is a true asset and hidden gem in New York. Their experienced staff and strategic thinking is demonstrated by many of their programs. NYSERDA is and will continue to be a keystone in building New York's leadership in energy. We should continue to leverage NYSERDA's work.

New York has invested in key assets in the energy sector and has lots of momentum. We need to keep the momentum going and take this to the next step of actually capitalizing on many of these new investments.

We need to be realistic when thinking about science and technology investments. The investments are long term and may take longer than one election cycle to yield dividends. New York is fortunate to have an Energy Plan that establishes a longer-term vision. That kind of strategic planning should continue to guide the State's investments in its innovation economy.

Specifically, we need to be thinking about how to leverage the federal dollars invested in the Department of Energy's five Energy Frontier Research Centers in New York, second in number only to California – an accomplishment the State should be proud of. This money is focused on basic research and not on transitioning that research to the marketplace. We applaud NYSERDA and NYSTAR – another valuable entity that we need to continue to leverage – for recognizing the need to think about how this research can be taken to the market by matching funding, but clearly this is not enough.

We need to think of a way to capitalize on these investments. At the federal level, Energy Secretary Steven Chu proposed energy innovation hubs to fund and coordinate interdisciplinary research on targeted energy challenges. Each of the eight hubs would have a distinct focus, such as solar energy, energy-efficient buildings, or the smart grid. The hubs would be in frequent contact with one another. Therefore, benefits of the hubs' research are shared, with their distinct focuses reducing redundancy. A primary feature of the hubs – and one that would distinguish them from some more traditional research centers or labs – would be their interdisciplinary nature. Research would draw from not just the hard sciences but also the social sciences, public policy, and law, and utilize relevant expertise in their surrounding communities. That could foster cluster formation around each hub's particular field of research, yielding significant economic as well as

environmental benefits. Although DOE requested $280 million for this initiative for FY 2010, it remains uncertain how many of the hubs will ultimately get funded. New York needs to be thinking of similar models to leverage the work at the new EFRC's. The Clean Energy Advanced Research (CLEAR) Centers, proposed as part of the *Operating Plan for Investments in New York under the CO_2 Budget Trading Program and the CO_2 Allowance Auction Program*, are an example of the type of activity that is needed. These Centers are expected to conduct leading applied and translational research to develop and support industrial activity in New York through the commercialization of technologies. Unfortunately, funding for only one of these Centers is included in this budget. Whether it is through these Centers or through another concept, more resources are needed to realize any significant economic or environmental impact.

To that end, the New York Academy of Sciences recently completed a project partnering with NYSERDA and NYSTAR. We convened two workshops in the spring of 2008 that were the culmination of a nearly year-long Phase I effort to identify the areas of science and technology that had the most economic promise for New York State. The following four technology areas were identified as the core strengths of State: 1) Materials, 2) Life Sciences, 3) Information Technology, and 4) Clean Technology. Cleantech was selected to be the focus for Phase II of the project because it is an emerging area of research and, in many ways, the three other core R&D strengths can be considered enabling technologies for the many cleantech sub-areas.

Similar to Phase I, Phase II of the project, implemented by the Academy in collaboration with both NYSTAR and NYSERDA, began with extensive interviews of key stakeholders in industry, academia, and government. The Academy conducted additional independent research on cleantech R&D assets and on innovation and public-private partnership models that could be adapted to New York State. The results of these efforts were presented at a workshop with key stakeholders, held at the Academy on May 18th, 2009. Included in the workshop were breakout sessions, "Fostering Innovation" and "Technology Opportunities," to refine the recommendations. Based on background research, interviews, and feedback from the workshop, three key needs were emphasized: 1) early stage capital, 2) inventory of the assets, and 3) networking of the assets.

These needs are summarized below:

1) Early Stage Capital: The National Science Foundation's *Science and Engineering Indicators 2004* report revealed that less than 1.5% of US venture capital funding is available for proof of concept and early product development stages. The uncertainty of returns is simply too high for venture capitalists to invest here; they wait until technologies are closer to actual production. Hence, entrepreneurs are often forced to redirect their efforts to low-risk incremental research and development rather than high-risk breakthrough programs in order to obtain needed funding. Alternatively, they stick to their original business plans hoping to secure funding through "angel" funds (family, friends, or their own capital). In the first case, the risk is missing out on game-changing technologies that have big economic and societal benefits, and, in the second case, it is not fostering entrepreneurship, and in fact creating an environment in which entrepreneurial success is much more difficult. Therefore, the State should consider

creating a fund or program such as the National Institute of Standards and Technology (NIST)'s Technology Innovation Program (TIP) to provide early stage funding for companies to help the companies cross the "Valley and Mountain of Death."

2) Inventory of Assets: It became evident that we must assemble an inventory of existing clean technology assets in the State. This aids New York-based businesses to identify local researchers, manufacturers, suppliers, contractors, and customers – key to making a business successful. Additionally, organizing this information would certainly help to market the State, not only to attract federal money, but to attract businesses that would easily see all the support they could tap if they relocated to New York.

3) Networking of Assets: More than just taking an inventory, we must connect these assets in a strategic way that will foster regional economic development – i.e. cluster development. We should think about this from a technological and regional perspective, helping multi-disciplinary collaborations form by virtue of their proximity. Furthermore, this initiative needs to be actively managed; passive networking without a neutral body owning the activity will produce suboptimal results, as have been seen by past efforts.

To conclude, New York State has many significant, already established sources of strength, which must be further leveraged and connected. We have top-tier universities, major corporate R&D facilities, a national lab, and numerous other renowned institutions that, if leveraged strategically, could propel New York to leadership in clean energy technology. By surrounding these institutions with a robust innovation system, we will move closer to creating the solutions to our energy challenges, improving our environment, and fostering economic prosperity for New York State at the same time.

Thank you for your time today.