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MINUTES OF THE NEW YORK STATE ENERGY PLANNING BOARD MEETING HELD ON MAY 7, 2012

Pursuant to notice dated April 26, 2012, the fifth meeting of the New York State Energy Planning Board ("Board") was convened on May 7, 2012 at 1:00 p.m. at the Albany office of the New York State Energy Research and Development Authority, 17 Columbia Circle, Albany, New York. A copy of the meeting Notice is annexed as Exhibit A.

The following Energy Planning Board Members or their designees were present:

- Francis J. Murray, Jr., President and CEO of the New York State Energy Research and Development Authority and chair of the Board
- Garry Brown, Chairman of the NYS Public Service Commission
- Thomas Coakley
- Joe Martens, Commissioner of the NYS Department of Environmental Conservation
- Kenneth Adams, Chairman and CEO of Empire State Development (Joe Chan, designee)
- Darrel Aubertine, Commissioner of the NYS Department of Agriculture & Markets (Geoff Palmer, designee)
- Assemblyman Kevin Cahill (Conor Bambrick, designee)
- Joan McDonald, Commissioner of the NYS Department of Transportation (Robert Zerillo, designee)
- Dr. Nirav Shah, Commissioner of the NYS Department of Health (Robert Chinery, designee)
- James Sherry, Director of the NYS Division of Homeland Security and Emergency Services (Brian Wright, designee)
- Stephen Whitley, President and CEO of the New York Independent System Operator (Patrick Curran, designee)

Also present were John Williams, Director of NYSERDA's Energy Analysis program and director of the Board's Working Group; Hal Brodie, NYSERDA General Counsel and Counsel to the Board; and David Munro, NYSERDA Deputy Counsel and secretary to the

Board. In addition, the meeting was attended by Robert Hallman, the Governor's Deputy Secretary for Energy and the Environment, and staff from various entities on the Board as well as members of the public.

Mr. Murray called the meeting to order. He advised that the meeting was being videotaped, and the video will be placed on the Energy Planning Board website.

Mr. Murray stated that there were several items on the meeting agenda: (1) reviewing the minutes from the Board's fourth meeting on April 2, 2012; (2) several presentations from various agency staff; and (3) scheduling of upcoming board meetings.

Minutes from April 2012 Meeting

Mr. Murray stated that a copy of the draft Minutes of the April 2, 2012 meeting was provided to Board members prior to the meeting. He stated that on May 4, NYSERDA received a request from the Department of Transportation (DOT), seeking to replace the final paragraph in the section of the draft minutes pertaining to DOT's presentation. The presentation, on page 9 of the draft minutes, provided an overview of New York State's 511 Travel Information System, which allows individuals to access traffic information by phone. DOT's proposed changes expanded upon that discussion. Mr. Murray noted that DOT's proposed revised language was included in each Board member's packet.

Whereafter, upon motion duly made and seconded, and by unanimous voice vote, the Minutes of the April 2, 2012 meeting were approved as revised by DOT's additional text.

Mr. Murray stated that the presentations by agency staff would address various alternative scenarios when modeling of the electricity system; development of a clean energy economy, including several economic development strategies as well as clean energy workforce activities; and public health issues related to energy. He noted that copies of the presentations were included in folders provided to Board members, and the presentations will also be posted on the State Energy Planning website, at

http://www.nysenergyplan.com/boardmeetings.html

These Minutes provide a high-level summary of each of the presentations.

Mr. Murray said the first presentation would be by NYSERDA program manager Karl Michael, who would once again address modeling of the electricity system, which is a critical component of the Plan. At the Board's last meeting, Mr. Michael provided an overview of how the Working Group goes about modeling the electric system. He also advised last meeting that the New York Independent System Operator (ISO) would be releasing up-to-date transmission and generation data as well as load forecasts. Mr. Murray stated that the Energy Plan modeling is now incorporating this new ISO data, and Mr. Michael would talk about results that come from those efforts. He would also identify several possible modeling scenarios and would ask for some feedback from the Board. Mr. Murray stated that the Working Group could then run a few scenarios and present results at future Board meetings.

Mr. Michael stated that the following model inputs have been updated since the April Board meeting with data provided by the NYISO:

- Load forecasts from NYISO, ISO-New England and PJM Interconnection (operates wholesale electricity markets encompassing about a dozen eastern and midwestern states)
- Planned builds and retirements of generation units
- Transmission capabilities and transfer limits
- Natural gas prices
- Oil use

Mr. Michael stated that while the new input data are critical to developing electricity system modeling results that are as accurate as possible, the updated results are not substantially different from the preliminary results presented at the April Board meeting with respect to projected energy and capacity needs and system operation. Mr Michael presented two different reference cases, showing generation mix and projected capacity needs, depending on whether or not the licenses for the Indian Point nuclear units are renewed. The modeling results indicated that without Indian Point power, a significant amount of additional generation capacity is likely to be needed prior to 2020.

Mr. Michael then outlined several possible model runs, as follows:

- Higher/Lower load than NYISO's planning forecast
- Higher/Lower natural gas prices
- Additional increment(s) of energy efficiency
- Additional increment(s) of renewable resources
- Additional transmission capabilities
- Load growth due to electric vehicle penetration
- Specific generation unit additions, repowering or retirements

Garry Brown suggested that it would be important to look at the ramifications of electrification of the transportation sector. Mr. Michael responded that this type of analysis has been done previously, and that modeling could be done using similar methodology with updated assumptions for vehicle penetration levels, electricity use, and load shapes.

Mr. Michael stated that modeling would continue to compare future energy needs with and without Indian Point. Mr. Murray asked the Board members to reflect on whether other variables or assumptions should be included in future model runs. He requested that members so advise him within the next two weeks, so that the Working Group could take such variables into account in future modeling.

Innovation in the Clean Energy Economy

Mr. Murray stated that the next several presentations would address how to grow the clean energy economy in New York State, together with the workforce development and training programs that will be needed.

Janet Joseph, NYSERDA's Vice President for Technology and Strategic Planning, discussed how the Plan can advance policies to support the development and growth of globally competitive clean energy industries in New York that drive economic expansion and job creation. She first stated that the "clean energy economy" can be defined as "economic activity that produces goods or delivers services designed to increase energy efficiency or generate renewable energy." This includes solar, wind, advanced transportation, advanced building technologies/services, and energy storage.

Ms. Joseph stated that development of New York's clean energy economy offers wide-ranging opportunities to help meet the energy needs of the 21st century and stimulate environmentally sustainable economic activity. New York is well positioned to compete for a substantial share of the expanding global market for clean energy economy technologies. The State is a leader in energy innovation with a well established world-class research infrastructure, major financial and venture capital industries, an excellent higher education system, and a productive skilled labor force that can readily transition into new energy industries and markets.

Ms. Joseph stated that the global market for clean energy technologies is estimated to be over $300 billion in 2011, including supply side and demand side technologies and services. Energy efficiency products and services are estimated to be about $70 billion in 2011 and to grow to over $100 billion by 2017. Solar, biofuels and wind power segments, which currently have a global market of about $250 billion, are estimated to grow to $385 billion in 10 years. These rapidly expanding global markets could offer a new source of jobs and economic growth for New York. Ms. Joseph stated that New York's clean energy economy currently employs on the order of 100,000 to 150,000 employees. The Brookings Institution ranks New York's clean economy 2nd among the 50 states. Albany's clean economy jobs make up 6.3 percent of all jobs in the region- the highest concentration of clean economy jobs in the nation.

Ms. Joseph described current programs and policies that can help stimulate growth in New York's clean energy sector. They include the following: R&D programs; university investments; early-stage business development programs; regional initiatives, clusters, and Regional Economic Development Councils (REDCs); and workforce development programs. She emphasized that a clean energy economy does not happen overnight – it takes purposeful investments at the industrial level and the public policy level over many years. Ms. Joseph stated that New York has a long history of supporting energy R&D. Several universities in New York have, within the past few years, sights on the clean energy sector. More recently the state has launched some early-stage business development programs recognizing that entrepreneurship will play a key role in the growth of this sector. Under Governor Cuomo there is now a focused effort under way to support regional economic development, and this can help to strengthen emerging cleantech clusters. New York has a well developed clean energy workforce program. Significantly, all of these initiatives have been public-private partnerships.

Ms. Joseph then discussed the key elements needed to maximize clean energy job growth. These include the following: supporting clean energy market creation & development; fostering a technology innovation and commercialization "ecosystem"; enhancing current economic development practices to further promote the creation and growth of clean energy

businesses; increasing access to capital; and developing clean energy workforce across the entire business lifecycle.

Building on this, Ms. Joseph highlighted some challenges and opportunities for New York related to maximizing clean energy job growth:

- market demand for clean energy goods and services is critical but it is the global market demand that really drives major business decisions. Some state-based demand policies will have a local effect; others may not.

- a new model for innovation is needed – one that seeks to develop more of an integrated network of researchers, developers, financers, and market players. New York is a powerhouse of new clean energy technology ideas and intellectual property, but several studies concur that New York could do a better job at commercializing the developments here

- enhancement of the State's current economic development practices is needed to promote entrepreneurship and new business venture creation- a clean energy economy will not be sustained by business attraction alone

- additional capital is required for improvements and innovations in the clean energy sector. While last year was a record year for venture capital investment, more private capital needs to flow into New York ventures.

Ms. Joseph stated that as New York starts to grapple with specific policies to address these challenges and opportunities, policy makers need to be cognizant of the importance of government setting the table for business expansion - not picking winners. Potential areas of focus going forward include the following:

- continuing to build strategic innovation assets
- developing nascent clusters and building innovation networks
- enabling the advanced manufacturing renaissance in NY
- capitalizing on tremendous export opportunities
- gathering key economic data for decision-making

Garry Brown suggested that the Plan examine the impact of natural gas prices on development of the clean energy economy. He pointed out that while cheap natural gas makes it more difficult for alternative energy to compete, it may also attract more manufacturers to locate in New York. Robert Zerillo suggested that it would be important to ensure that the State's transportation infrastructure be adequate to support new businesses. Joe Martens stated that the Plan should look at what other states, especially border states, are doing to attract businesses.

Mr. Murray stressed the need to take the long view with regard to investments in clean energy, noting that New York first began investing in clean tech in the Capital District more than two decades ago, when Mario Cuomo was Governor.

Mr. Murray then introduced Joe Chan, Executive Vice President for Business Development at Empire State Development. Mr. Chan stated that through the use of loans, grants, tax credits and other forms of financial assistance, ESD strives to enhance private business investment and growth to spur job creation and support prosperous communities across New York State. ESD has 10 regional offices and is also the primary administrative agency working with the Regional Economic Development Councils.

Mr. Chan explained that ESD specialized services include the following:

- ESD Regional Offices are experts in the benefits and opportunities available locally; they bring a full range of resources and information to enhance the success of a venture
- the Strategic Business Division works with industry clusters, such as clean-tech, and gives employers considering multiple sites in New York a "big picture" view
- the International Division runs trade missions and maintains foreign offices to increase export opportunities, as well as attract direct foreign investment
- the Small Business Division supports the development and expansion of small businesses through access to capital and technical assistance
- the Division of Minority and Women-Owned Business Development maintains a directory of certified MWBEs and assists state agencies to award a fair share of state contracts to MWBEs.

Mr. Chan explained that ESD's Principal Incentive Programs include the following: Loans & Grants; the Excelsior Jobs Program, which provides tax credits to stimulate new investment and job creation; and Financing & Technical Assistance, including the Linked Deposit Program, which provides reduced rate financing for project development. Principal Incentive Programs are most frequently used to: partially defray the cost of real estate acquisition, construction or renovation; purchase machinery and equipment; or assist with training of employees.

Mr. Chan stated that ESD regional and specialized program staff reach out to businesses and other entities to identify and facilitate opportunities that will benefit the State's economy, result in good jobs and quality investments. Partners in development include:

- private sector businesses and consortiums (NY BEST, NY Smart Grid Consortium)
- other State agencies (Departments of Labor, Transportation, New York Power Authority, NYSERDA) as well as local and regional marketing and economic development organizations (Center for Economic Growth, Greater Rochester Enterprise, Buffalo Niagara Enterprise, etc.)
- Counties, Industrial Development Agencies and local governments
- utilities
- business advisors such as consultants, site selectors, real estate brokers, developers, and others

Mr. Chan listed several recent ESD Clean Energy Projects:

- Smith Electric Vehicles – a new manufacturing facility in New York City for all-electric commercial vehicles
- General Electric Company – a new battery manufacturing plant in Schenectady for applications in the transportation sector
- Griffiss Business and Technology Park – development of a biomass generating facility in Rome that will provide steam and electricity for customers in the technology park.

In response to a question from Mr. Coakley as to whether ESD was in fact "picking winners," Mr. Chan explained that ESD makes limited, defensible investments that can hopefully be leveraged many times over by the private sector. Mr Chan stated that ESD needs to be mindful both of entities that can create new jobs, as well as those who may opt to leave New York for what they perceive to be a more favorable economic climate elsewhere.

Mr. Murray then introduced Frank Surdey, a Managing Economist at the New York State Department of Labor (DOL), who presented findings from a survey DOL recently conducted regarding New York's clean energy industry. Mr. Surdey stated that existing systems that measure industry and occupational trends are not adequate to measure the clean energy economy without significant intervention. For example, a HVAC (heating, ventilation and air conditioning) company may do a significant amount of clean energy work, e.g., installing solar or thermal energy systems, while another HVAC company may not be involved in clean energy work – yet both are classified in the same North American Industry Classification Code (NAICS). The NAICS system does not have the ability to identify the clean energy activity at these HVAC companies.

Mr. Surdey described two recent studies that sought to determine how many green jobs there are in New York. A study by Brookings-Battelle included only establishments that add value to clean products using skills and technologies that are unique to the clean economy. That study identified 185,000 clean energy jobs in New York. A study by the U.S. Department of Labor's Bureau of Labor Standards defined a green job as one that produces goods or provides services that benefit the environment or conserve natural resources. That study identified 248,500 green jobs in New York, higher that any state other than California.

Mr. Surdey explained that as part of the American Recovery and Reinvestment Act, DOL was awarded a $1.1 million grant from the U.S. Department of Labor to conduct research on the green labor market in New York State. As one part of the study, DOL and its research partners surveyed 20,000 businesses in seven industry clusters in late 2010 to determine the number and types of green jobs in the State. All businesses with 25 or more workers were surveyed as were one-quarter of smaller firms- representing approximately 13% of the overall state economy. DOL received a 40% response rate, which is very high. The survey focused on 4 industry clusters: construction trades; component manufacturers; professional services (e.g., legal services); and building services. The survey defined a green job as one whose duties primarily involve producing goods or delivering services that increase energy efficiency or generate renewable energy. Examples included: manufacturing components for wind turbines or solar panels; energy retrofitting existing homes; scientific research and development that promotes renewable energy or energy efficiency; and HVAC and performance monitoring/optimization on residential buildings.

DOL's survey identified almost 15,000 green firms, and about 180,000 green jobs. Construction recorded the highest number (76,600) and share (34%) of green workers followed by professional services (65,800 or 31%). For firms with green jobs, anywhere from 26 to 42% expected to add more green jobs in the next year, whereas for firms without green jobs, the numbers were significantly lower. Across all clusters, the Leadership in Energy and Environmental Design (LEED) credential was the most preferred by firms with green employees. Certification by the Building Performance Institute, Inc. (BPI), an independent non-profit organization that develops industry standards for residential energy efficiency retrofits and weatherization, was viewed as important in the building services and construction trades. Many firms are engaged in more than one green activity, with energy efficiency being the most prevalent.

Mr. Surdey concluded by stating that DOL and NYSERDA have jointly collaborated to create a Green Careers website, found at www.greencareersny.com. That site contains the findings from DOL's study as well as a Green Business Directory by Region, Industry, and Category; Green Job Boards and Career Exploration Tools; and a list of training Programs and Eligible Training Providers.

Mr. Murray then introduced NYSERDA Program Manager Adele Ferranti, who provided an overview of NYSERDA's Workforce Development and Training programs. Ms. Ferranti explained that programs (1) provide new skills to existing workers, and (2) identify needs of emerging workers, particularly disadvantaged ones, in order to provide the basic technical skills necessary to enter the clean energy job market. She explained the framework within which NYSERDA and its training partners work: they (1) identify the demand for skilled labor from various programs (EEPS, RPS, Green Jobs, etc); (2) examine job projections and workforce needs (educational training requirements, license/certifications, occupational skills, etc), and (3) ascertain worker supply. Ms. Ferranti stated that there is approximately $127.6 million in workforce training funding that has been leveraged from various federal and state programs.

Ms. Ferranti stated that Workforce Development and Training Programs for the State's clean energy sector include the following: Career pathways/Basic Skills training; Technical training/2-4 year degree and continuing education programs; National worker credentialing (LEED, BPI, National Assn. of Homebuilders, etc); and Internship and R & D fellowships. Businesses receive On-the Job funds to hire and train new workers and incumbent workers being trained for advancement and new skills. Job seekers are supported through DOL career counseling, training, and job placement assistance through NYSDOL's One-Stop Centers that are located across the state. NYSERDA funding is provided for activities such as equipment, train-the-trainer instruction, and program accreditation.

Ms. Ferranti briefly summarized clean energy workforce activities being designed to support the construction trades, professional services, and building services sectors. For construction trades (76,000 employees and 2800 firms in NYS), funding is primarily from the RGGI/Green Jobs and Energy Efficiency Portfolio Standard (EEPS) programs. Training funds are focused on basic skills, hands-on skills development and workforce credentials. With regard to professional services (31,500 employees and 2800 firms), training funds are focused on expanding trades and building services training to include energy efficiency topics and

workforce credentialing. Funding also supports training for energy services companies as well as architects and engineers that can deliver energy savings and secure future economic benefits for New York State. Funding for the building services sector (65,000 employees and 4000 firms) is focused on expanding trades and building services training to include energy efficiency topics and workforce credentialing.

Finally, Ms. Ferranti presented a map showing the location of over 900 clean energy training centers across New York and a sample of the 50 training entities that have been supported by NYSERDA.

Health and Energy Planning

Mr. Murray stated that the final presentation to the Board would be by Henry Spliethoff, a Research Scientist with the NYS Department of Health (DOH). Mr. Spliethoff introduced the Health Department's mission to protect, improve and promote the health, productivity, and well-being of New Yorkers and he provided some examples of DOH activities relevant to energy issues, including the following:

- working with DEC, other agencies and local partners to develop and implement regulatory and other programs in addressing public health issues
- implementing studies to evaluate health risks
- communicating risk and promoting healthy behavior
- responding to community health concerns
- conducting health outcome surveillance.

Mr. Spliethoff stated that energy has many benefits, but also a diverse array of potential health concerns associated with energy production, use and distribution. Examples include air pollution from fossil fuel power plants and vehicle traffic, nuclear safety, and potential health impacts of climate change, but there can also be risks associated with electricity transmission (non-ionizing radiation), home heating systems (from ambient air impacts of outdoor wood boilers to the indoor air impacts of furnaces), fuel distribution and residential end user storage, and transportation planning that is not compatible with a healthy lifestyle. There are also health impacts of power outages.

Mr. Spliethoff then discussed examples of health outcomes associated with energy, including: respiratory disease; cardiovascular disease; cancer; central nervous system effects; and heat-related morbidity/mortality. He also presented these statistics regarding asthma, a major public health problem in New York State:

- asthma affects 1 in 11 New Yorkers (1.3 million adults, 475,000 children)
- the prevalence of asthma in New York is above the national average
- $535 million in annual hospitalization costs, plus additional costs of medication and missed work due to illness, death
- hospitalization and death rates are higher in poor, minority areas
- hospitalization rates are 5 times higher for minorities than for whites

Mr. Spliethoff stated that a significant percentage of pollutant emissions in New York can be attributed to the production, use and distribution of energy: 63% of particulate matter ($PM_{2.5}$); 99% of oxides of nitrogen (NO_x); and 97% of sulfur dioxide (SO_2). He added that air pollution (PM, NO_x, SO_2, ozone) can exacerbate asthma. For example, according to the U.S. Environmental Protection Agency, summer ozone has been associated with 10-20% of respiratory hospital visits/admissions in the northeastern United States. While air quality has been improving dramatically in recent years, 66% of the State's population - or 12.8 million people - live in the 11 counties that are not in attainment of one or more health-based National Ambient Air Quality Standards ($PM_{2.5}$ annual, $PM_{2.5}$ 24-hour or ozone) under the Clean Air Act.

Mr. Spliethoff next addressed how asthma risks associated with energy can be reduced. He stated that data can be analyzed to suggest energy sectors where emissions reductions could have the greatest impacts. He then discussed several other major public health concerns. Cardiovascular disease (CVD) is the leading cause of death in the state and in the nation with a $32 billion total cost in NY (2008). As with asthma, minority populations have higher hospitalization and mortality rates. Air pollution (PM, O_3, CO) is associated with increased CVD hospitalization and mortality, and consequently, reducing emissions may help reduce risks. Diabetes and obesity (CVD risk factors) are also major public health problems, and increasingly significant. Providing opportunities for exercise (walkable communities, bike trails, community gardens) through "smart growth" policies may help reduce risks presented by our sedentary lifestyle.

Mr. Spliethoff discussed several other energy-related health issues. Each year 15,000 petroleum-related spills occur in New York State (4,500 heating fuel spills, 3,000 at private residences). New York State has spent $20 million annually on spill cleanups. DOH responds to more than 300 residential fuel oil spills per year and facilitates relocation of significantly impacted residents to protect health. There are 15,000 carbon monoxide (CO) poisoning emergency department visits in U.S. annually, and home heating systems are the primary cause. In New York, there are about 2,000 emergency room visits for CO poisoning annually. CO poisonings can also occur as result of power outages and generator use- for example, 264 people were poisoned during a 2006 winter storm in Western New York

Mr. Spliethoff then discussed several completed and ongoing DOH studies designed to increase the understanding of the relationship between energy use and health impacts:

- DOH has concluded that EPA's multi-state NO_x control policy may have had a positive impact on both air pollution statewide and respiratory health in some regions of the State
- DOH studies of residential biomass-burning show that outdoor wood boilers can significantly increase fine PM concentrations above regional background in outdoor air near residences
- DOH studies examining the impacts of a power outage have shown that (1) mortality and respiratory hospital admissions in New York City increased two- to eightfold during the 2003 Northeast blackout, and (2) higher socioeconomic status populations are more vulnerable due to dependence on air conditioning
- Studies of climate change (increasing temperature) show an increase in hospitalizations for acute renal failure. Increased daily minimum temperatures are associated with

increased risk for birth defects. Additionally, lower socioeconomic status and racial/ethnic minorities are more vulnerable to heat-related cardiovascular, respiratory, and renal hospitalizations.

Mr. Spliethoff then discussed several DOH data collection programs. The Environmental Public Health Tracking program tracks hazards, exposures, and diseases to understand how patterns and trends change over time and across regions. Additionally, DOH began providing health data to DEC for review of major permit applications in environmental justice (EJ) areas in 2006. The new Article 10 Power Plant Siting Law requires a review of health data for permitting of power plants in EJ communities. A protocol developed by DOH describes the selection of health outcomes and comparison areas, data display and analysis.

Mr. Spliethoff closed his presentation by posing a question: How can we better integrate consideration of health impacts/benefits into energy policy?

Garry Brown suggested that the draft State Energy Plan point out that many parts of the state will remain in nonattainment under the Clean Air Act due to upwind pollution, regardless of efforts to decrease emissions from in-state power plants and other sources. Mr. Spliethoff stated that this issue will be addressed in the public health and environmental impacts chapters of the draft Plan.

In response to a question by Conor Bambrick, Mr. Spliethoff stated that DOH has been conferring with DEC staff regarding potential health impacts associated with hydrofracking, and that issue will be addressed in the public health chapter of the Plan.

Upcoming Board Meetings

Mr. Murray stated that the Energy Law directs the Board to publish a draft Energy Plan by September 1, 2012. He reminded the Board that it decided at its February 2012 meeting that the Board should meet monthly between now and September. He advised that the next meeting will be on June 4th, from 11 a.m. until 1 p.m., earlier in the day than the Board has been meeting. Subsequent board meetings will begin at 1 pm.

The final agenda item was other business; there being none, the meeting was adjourned shortly before 3 p.m.

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David A. Munro, Secretary to the Board
Deputy Counsel, NYSERDA