Energizing the Future:
The Benefits of Renewable Energy for New York State

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I. Executive Summary

New York State has the potential to produce more of its energy from renewable sources and contribute to the growth of the renewable energy sector. By generating more renewable energy, the State could spur job growth in a high-skilled, high-wage sector; increase income for farmers and ranchers; stimulate in-state investments; increase tax revenue; retain energy expenditures that currently leave New York; cut back on the release of harmful pollutants; reduce public health care costs; reduce State dependence on foreign oil; and provide consumers with energy that is not subject to the volatile fluctuations of petroleum and natural gas prices.

New York is well-suited for the development of renewable energy. In addition to its waterways, which currently produce hydropower, the State has an abundance of natural and human resources that could be harnessed to create renewable energy. New York ranks 15th in the nation in wind energy potential[1]—higher than California—and receives sufficient solar energy to power homes equipped with solar roof tiles.[2] The State's agricultural land can also produce fuel for biomass power generation. Moreover, advanced research in renewable energy technologies is being performed both in the State university system and in private universities across New York.

To date, New York has taken significant steps to stimulate growth in the renewable energy sector. In September 2004, the New York State Public Service Commission (PSC) adopted a Renewable Portfolio Standard (RPS), which set a goal to obtain 25 percent of the State's electricity from renewable sources by 2013. This office estimates that the production of renewable energy to meet the mandates of the RPS could generate up to 43,000 new jobs in New York State.

In addition, Statewide elected officials have promoted renewable energy. For example, Senator Hillary Clinton has highlighted economic development opportunities within the sector, and in February 2004 she was the keynote speaker at a forum sponsored by New Jobs for New York on the State's existing renewable energy resources.

While actions have been taken to stimulate growth in the industry in-state, obstacles still exist. Subsidies for renewable energy must be comparable to those provided for fossil fuels in order to enable renewables to be more cost-competitive with energy from conventional

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1 American Wind Energy Association (AWEA), "New York State: Wind Energy Development," http://www.awea.org/projects/newyork.html (accessed March 2, 2005). [Hereafter cited as AWEA, "New York State: Wind Energy Development."]

2 Office of Energy Efficiency and Renewable Energy (EERE), U.S. Department of Energy, "New York Solar Resources," http://www.eere.energy.gov/state_energy/tech_solar.cfm?state=NY (accessed March 2, 2005); and Barry Hopkins, for Council on State Governments, *TrendsAlert: Renewable Energy and State Economies*, May 2003, under "Products," *TrendsAlert* archives, http://www.csg.org [Hereafter cited as Hopkins, *TrendAlert: Renewable Energy*].

sources. In addition, State energy laws and regulations must be updated to encourage further development of renewable energy.

Legislative action is needed to promote the purchase of renewable energy by both municipalities and State government agencies; to encourage the development of small, distributed generation from renewable sources; to revise and renew the Article X process for siting electric generation facilities; and to establish the RPS in law. As the RPS is implemented, economic development incentives should be developed to attract the renewable energy industry to New York.

Regulatory action is also needed to reduce barriers to distributed generation. The PSC should consider updating its regulations to reduce hurdles that make it unnecessarily difficult or costly for small, localized power sources to connect to the main power grid.

New York must support education and training for the State's skilled workforce; encourage and support research and development; and provide a centralized source of information about renewable energy policies and programs. We must also maximize the benefits of funding and tax incentives that support the growth of the renewable energy industry by reviewing the efficacy of existing tax incentives, and by ensuring that the New York State Energy Research and Development Authority (NYSERDA) has appropriate resources and uses them effectively.

One of the most significant sources of funding for development of renewable energy resources is the System Benefits Charge (SBC), which is levied on the customers of the six investor-owned utilities. The Office of the State Comptroller will conduct an audit of the SBC to identify ways in which the proceeds are being employed effectively, opportunities to redirect these funds to better support New York's renewable energy programs, and methods to improve transparency.

By encouraging the use of renewable energy, New York will stimulate job growth, increase rural incomes, expand local tax bases, and keep more energy dollars from leaving the State. Investments made today in in-state renewable energy resources will contribute to a stronger, more diverse New York economy.

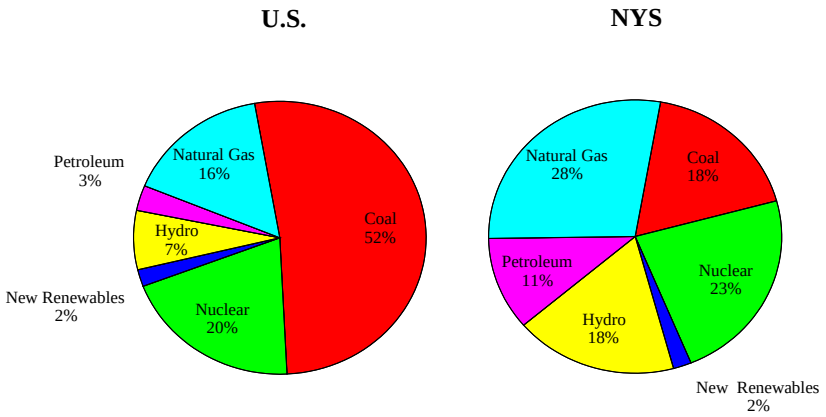
II. Introduction

The use of renewable energy, which is derived from natural resources that are not depleted when used at sustainable levels, is growing in the United States and worldwide. Globally, about 19 percent of electric energy is generated from renewable sources—mostly from hydropower. However, "new" renewables such as solar, wind, and biomass power are expected to double their share of the world fuel mix by 2030.[3]

In 2000, only 9 percent of the electricity used in the United States was drawn from renewable sources, with all but 2 percent from hydropower. More than 70 percent of the electricity used in the nation was generated from fossil fuels, including coal, natural gas, and oil (see Graph 1). New York's electricity-generating fuel mix showed a similar dependence on nonrenewable sources, although 20 percent of its electricity was generated from renewable sources.[4]

Graph 1

Electricity Generation Fuel Mix 2000



Source: Office of Energy Efficiency and Renewable Energy, Department of Energy

Some states are striving to greatly increase their share of renewables. California is aiming to get 20 percent of its electric energy from renewable sources by 2010, while New York, which currently gets close to 20 percent of its energy from renewable sources (all but 2 percent from hydropower), recently adopted a goal of 25 percent by 2013.

The renewable energy sector is relatively young, but it is expected to grow rapidly during the next ten years. According to the market research firm Clean Edge, worldwide revenue from solar equipment sales and installation reached $4.7 billion in 2003, and is projected to rise to more than $30.8 billion by 2013. Wind power revenue is projected to rise from $7.5 billion in 2003 to $47.6 billion by 2013, and fuel cell revenue is expected to rise from $700 million in 2003 to

[3] Marianne Haug, Director of Energy Efficiency, Technology and R&D for the International Energy Agency, "Energy Perspectives: Future Energy Requirements and the Role for Hydrogen," International Energy Agency website, September 2003, 5, http://www.iea.org/dbtw-wpd/Textbase/speech/2003/haug/grenoble.pdf.

[4] EERE, U.S. Department of Energy, "New York: Electricity Fuel Source," http://www.eere.energy.gov/state_energy/states_currfuelmix.cfm?state=NY (accessed March 2, 2005).

$13.6 billion by 2013. Combined, this would create a $92 billion industry over the next decade.[5]

The United States has experienced similar growth rates, which are projected to continue. In 1995, approximately $2.8 billion in sales were reported nationally for renewable energy systems and power.[6] This number reached $6.3 billion in 2000, and is projected to grow to $12.4 billion by the end of 2004. By 2010, U.S. sales of all renewable energy technologies are anticipated to generate over $30 billion in revenue.[7]

Much of this growth is due to declining production costs. According to a number of sources, over the past 20 years both wind and solar energy costs have dropped by 80 percent to 90 percent, and are expected to continue to decline in response to technological advances and economies of scale.[8] The price of wind energy has fallen from an average of 40 cents per kWh in 1980 to roughly 4 cents today—a cost that is already competitive with conventional energy sources.[9] (According to the Rocky Mountain Institute, a research group focused on environmentally friendly businesses, the current average wholesale price for wind energy is 4.2 cents per kWh, compared with 4 cents for coal, 6.8 cents for natural gas, 9.1 cents for oil, and 10 cents for nuclear power. The U.S. Department of Energy's Energy Information Administration calculates that the average price of energy from the following sources over a 20-year period beginning in 2010 will be: $50.54 per MWh for wind; $53.42 for coal; $49.66 for natural gas; and $61.32 for nuclear power.[10]) Researchers at the National Renewable Energy Laboratory, a national laboratory of the U.S. Department of Energy, predict that design improvements in the near future will reduce the cost of wind energy production to 2.5 cents per kWh.[11]

Solar energy is currently costlier than wind power—averaging between 12 cents and 29 cents per kWh[12]—but is nevertheless cost-competitive with fossil fuels in states such as California, when current subsidies and tax credits are taken into account.[13] The cost of producing

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5 Joel Makover, Ron Pernick, and Clint Wilder, *Clean Energy Trends 2003*, Clean Edge website, under "Reports," February 2003, 3, http://www.cleanedge.com. [Hereafter cited as *Clean Energy Trends 2003*.]

6 These figures include revenues from solar, biomass, wind, and fuel cell energy, and landfill gas systems, but do not include hydro and geothermal systems, which are generally not discussed in this report.

7 Environmental Business International Inc., "Opportunities for Business in Clean Energy Systems and Power in the State of California," 2001, 18.

8 Joel Makower, Ron Pernick, and Clint Wilder, *Clean Energy Trends 2004*, Clean Edge website, under "Reports," March 2004, 4, http://www.cleanedge.com. [Hereafter cited as *Clean Energy Trends 2004*.]

9 Virinder Singh, BBC Research and Consulting, and Jeffrey Fehrs, "The Work That Goes into Renewable Energy," Renewable Energy Policy Project, November 2001, 8 [Hereafter cited as Singh, "Work that Goes into Renewable Energy."]

10 The Associated Press, "Green Energy Gets More Attention," October 27, 2004.

11 BuildingGreen Inc., for the EERE, U.S. Department of Energy, "Greening Federal Facilities: An Energy, Environmental, and Economic Resource Guide for Federal Facility Managers and Designers," May 2001, http://www.eere.energy.gov/femp/pdfs/29267-0.pdf.

12 *Clean Energy Trends 2004*, 5; and EERE, U.S. Department of Energy, "DE Technologies," http://www.eere.energy.gov/de/basics/der_basics_dertech_pwr_ren_con.shtml (accessed March 2, 2004).

13 California Energy Commission, "Wind Energy in California," http://www.energy.ca.gov/wind/overview.html (accessed March 2, 2005).

electricity from biomass varies widely, ranging from 5 cents to 12 cents per kWh when used as a stand-alone energy source, but falls to less than 4 cents per kWh when used in combination with coal to fuel a generator—a process called co-firing.[14] Conventional energy sources have benefited from sizable tax incentives and subsidies;[15] if similar incentives were directed toward renewable energy technologies, the gap between conventional and renewable energy costs would narrow even further.

As emissions standards have tightened in response to environmental damage and related public health costs, the demand for clean, renewable energy has increased. Electricity generation currently contributes significantly to air pollution in the United States, accounting for 64 percent of all acid rain–producing sulfur-dioxide emissions, 40 percent of carbon emissions, 33 percent of mercury emissions, and 26 percent of smog-producing nitrogen oxides.[16] Furthermore, increased security concerns about centralized power plants, particularly nuclear plants, as well as U.S. dependence on foreign oil, have increased interest in renewable energy sources.

In compiling this report, the Office of the State Comptroller examined information from a variety of sources, including governmental regulatory and research entities, renewable energy companies, environmental advocates, utilities, and recent press accounts. This report focuses on solar, wind, biomass, and fuel cell energy, each of which has a strong potential for growth in New York State. Hydropower has been omitted because it is a long-standing technology that has already been well developed in New York.[17] Geothermal energy, which is produced by harnessing heat from beneath the Earth's crust, has also been omitted because New York State's geothermal resources are insufficient to generate electricity.[18] Technological discussions of each energy source are intended to be informational and not an endorsement of one technology over another.

Renewable Energy Technologies

Wind power is the fastest-growing energy technology in the world. Between 1990 and 2000, worldwide generating capacity increased at an average annual rate of 25 percent.[19] Wind

[14] Hopkins, *TrendsAlert: Renewable Energy*; and Pennsylvania State University, "Bioenergy," http://www.personal.psu.edu/users/a/a/aaq104/Bioenergy.htm (accessed March 8, 2005).

[16] Energy Information Administration, U.S. Department of Energy, *Electric Power Annual 2002*, Table 8.2, December 2003.

[16] Union of Concerned Scientists, "Renewable Energy and Electricity: Diversity, Stability, Security, and Environmental Stewardship," March 5, 2003, http://www.ucsusa.org/publication.cfm?publicationID=590, as cited in Hopkins, *TrendsAlert: Renewable Energy*, 5.

[17] New York has 219 hydropower projects with a total capacity of almost 5,500 MW (EERE, U.S. Department of Energy, http://www.eere.energy.gov/state_energy/states_currentefforts.cfm?state=NY (accessed March 2, 2005).

[18] EERE, U.S. Department of Energy, "Geothermal—Electricity Production," http://www.eere.energy.gov/RE/geo_electricity.html; and RenewableEnergyAccess.com, "Geothermal Energy," http://www.renewableenergy.com (accessed March 8, 2005).

[19] Singh, "Work that Goes into Renewable Energy," 9.

power is quiet,[20] efficient,[21] nonpolluting, and powered by a free, limitless resource, which makes the cost of energy production both fixed and known in advance.

Solar power is also growing rapidly worldwide, with applications ranging from home roof systems to solar power plants. Solar cells—also called photovoltaics (PVs)—transform sunlight directly into electricity through the use of a semiconducting material. PVs can be used in home roof systems, large commercial buildings, or solar power plants. Solar thermal technologies use a different method to produce electricity in which the sun's rays heat a fluid that powers a steam generator.[22] As with wind energy, the production of solar energy is quiet, pollution-free, and devoid of fuel costs.

Biomass energy is produced from organic fuel sources (called "biomass"), such as plant matter, animal waste, and methane gas emitted by landfills. The most common production method is the incineration of plant matter to create steam for powering turbines, which simultaneously generates heat for buildings and industrial processes.[23] Biomass materials can also be converted into liquid fuels (such as ethanol or biodiesel) or into gas, either by burning the fuel source under pressure in a "gasifier" or, in the case of manure, by converting the source into methane through the use of a bacterium. (While the combustion of municipal waste was considered an acceptable form of renewable energy generation in the past, many scientists and energy analysts do not include it in discussions about nonpolluting renewable energy today, because it can release substantial amounts of pollutants.) Biomass energy can supplement traditional coal-burning power plants through the process of co-firing. In addition, biomass systems can produce consistent power without interruption, which enables them to supplement solar and wind energy systems by providing a steady, or "baseload," power source. This ensures continuous delivery of electricity during times when wind and solar systems are not producing power.

Energy from fuel cells is generated through a chemical reaction—combining hydrogen and oxygen. Though fuel cells are not yet widely available commercially, they are an important emerging technology that can convert fuel into electricity more efficiently than power plants or internal combustion engines, and without producing toxic emissions or noise. Fuel cells are extremely reliable, which makes them an ideal power source for hospitals and high-technology facilities that must ensure an uninterrupted power supply. The reliability of fuel

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[20] AWEA, "Wind Energy FAQ," http://www.awea.org/faq/noisefaq.html; British Wind Energy Association, "Noise From Wind Turbines—The Facts," http://www.bwea.com/ref/noise.html; HealthLink, "Wind Pros and Cons, Myths and Misconceptions," http://www.healthlink.org/windproscons37.html; and Proven Energy, "Proven WT6000 Wind Turbine Noise Emission Report," http://www.almac.co.uk/proven/FILES/noi6000a.pdf (accessed March 2, 2005).

[21] Efficiency is defined as the ratio of "energy out" to "energy in." It is a measure of how much mechanical power can be extracted from the energy stored in the fuel source. Wind turbines are more efficient at producing power than are conventional fossil fuel–fired power plants.

[22] Though the Southwestern states have the highest solar intensity in the United States, most areas of the country, including New York, have adequate solar resources for providing electricity through the use of rooftop solar panels or PVs incorporated into a building's "skin."

[23] When processed using the best available technology, biomass energy produced from direct firing of organic materials releases no net carbon dioxide and only a minimal amount of emissions. (National Renewable Energy Laboratory, U.S. Department of Energy, "Choices for a Better Future: Perspectives on Renewable Energy," September 1999, 2.)

cells also makes them ideal for use as a baseload power source to back up solar and wind energy production.[24]

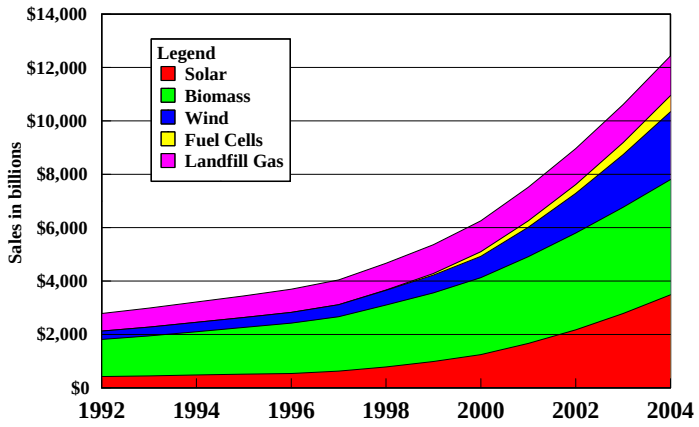
All of the above-mentioned technologies have the potential to produce energy at large power plants or at small, localized power sources. Using distributed generation (DG), localized power sources can supply power on-site, reducing the demand for energy from a main power grid. DG can reduce the burden on an electric grid at times of peak demand, provide power in the case of a power plant failure, or serve as an alternative to large, centralized power plants. In some instances, excess power can be sold back to utilities and brought into the grid, providing DG operators with added income.

[24] Natural Resources Defense Council, "Fuel Cells," Clean Air and Energy fact sheet, http://www.nrdc.org/air/energy/ffuelcl.asp (accessed March 2, 2005).

III. Renewable Energy's Potential Economic Impact on New York State

As the market for renewable energy grows, New York State has an opportunity to capitalize on its resources and expand in-state energy generation. While a number of states have already begun to invest heavily in renewable energy, none have fully realized the benefits associated with this sector. New York has not yet missed the chance to benefit from renewable energy, which is expected to generate $12.4 billion in revenues in the United States in 2004 (see Graph 2). In addition to providing good returns on investments, renewable energy could create thousands of jobs, increase incomes in rural areas, generate additional tax revenue, and keep New York's energy dollars from leaving the state.

Graph 2
U.S. Sales of Renewable Energy Systems and Power



Source: Environmental Business International, Inc.

A. Venture Capital and Corporate Investments

The expansion of New York's renewable energy industry could lead to an influx of capital into the state. Venture capitalists and other investors have recognized the tremendous potential of the renewable energy market. While overall venture capital investment fell 14 percent to $18.2 billion in 2003, investments in renewable energy rose by 8 percent, totaling $1.2 billion.[25] Alternative energy companies, which include renewable energy companies and some natural gas enterprises, secured close to $1 billion in initial and secondary public offerings last year[26] and accounted for 2.3 percent of total venture capital activity in 2003, compared to 0.7 percent just three years ago.[27]

Some of the more well-known venture capital and private equity firms that are investing heavily in renewable energy are Advent International, Arete, Beacon Energy Partners, Bear Stearns, Benchmark, The Carlyle Group, Merrill Lynch, Thomas Weisel Partners, U.S.

[25] Terence Chea, "Clean Technology Firms Attract Growing Share of Venture Dollars," *USA Today*, April 26, 2004.
[26] Diana Propper de Callejon, "Venture Capital/Private Equity: Environmentally Conscious Investing," *Investment Philosophy*, Morgan Stanley Dean Witter, Spring 2001.
[27] *Clean Energy Trends 2003*, 3.

Venture Partners, Vantage Point Venture Partners, Warburg Pincus,[28] and Nth Power. Many of these firms have launched funds specifically focused on renewable energy.

Large corporations are also investing in renewable energy. For example, General Electric (GE) has made a significant and successful investment in becoming a large-scale manufacturer of photovoltaics (PVs) and wind turbines. Since entering the market in 2002, GE has received over $2 billion in orders and commitments for wind turbines. GE's wind energy department, based in Connecticut, produced more than $1.2 billion in revenues in 2003, a 150 percent increase above the previous year's total.[29] PVs have been profitable for GE as well.[30] According to the *New York Times*, renewables are now one of the fastest-growing pieces of GE's portfolio of energy-related businesses.[31]

B. Job Growth

As compared to traditional fossil fuels, renewable energy is a labor-intensive sector that generates a wide variety of high-wage and high-skilled jobs in the areas of research and development; design and manufacturing; construction and installation of power-generating facilities (such as the turbine, solar array, and fuel cell); cultivation and collection of fuel in the case of biomass; and operation and maintenance jobs.[32]

Of the 2.7 million private sector jobs lost in the nation since 2000, 75 percent were in the manufacturing sector.[33] The renewable energy industry, particularly in the areas of wind turbine and PV manufacturing, provides New York with an opportunity to recapture some of those jobs.[34] Wind turbines, for example, would provide manufacturing jobs because portions of the turbines are so large that they must be constructed near their installation sites to avoid prohibitive transportation costs.[35] In addition, companies such as RWE Solar (formerly

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[28] Matthew Sheahan, "Outlook '04: Energy," *Venture Capital Journal*, February 1, 2004; DG Insight, *Merrill Lynch Funds DG*, http://www.energyinfosource.com/commentary/article.cfm?article_ID=1005, (accessed October 6, 2004); Morgan Stanley Dean Witter, *Investment Philosophy*, Spring 2001, 3; and Over the Counter Bulletin Board, http://www.otcbb.com/profiles/ARET.htm (accessed March 8, 2005).

[29] General Electric, "GE Sees Significant Growth in Wind Activities," press release, March 29, 2004.

[30] *Clean Energy Trends 2003*, 4.

[31] Barnaby Feder, "G.E. Signals Growing Interest in Solar," *New York Times*, March 13, 2004.

[32] Sam Swanson, Director of the Renewable Energy Technology Analysis Project at the Pace Law School Energy Project, in a letter to Susan Hudson of the Vermont Public Service Board, discussing a survey, prepared for Renewable Energy Vermont, of employment impacts of renewable energy investments, November 17, 2003.

[33] Apollo Alliance, "America Must Change Direction," http://www.apolloalliance.org/about_the_alliance/aboutapollo2.cfm (accessed March 2, 2005).

[34] Unions are aware of the job growth potential for highly skilled construction and manufacturing labor, and are eager to capitalize on it. A national coalition of labor, environmental, and business groups, called The Apollo Alliance, has formed to encourage the use of renewable energy and energy efficiency technologies.

[35] Dave Algoso and Emily Rusch, "Renewables Work: Job Growth for Renewable Energy Development in the Mid-Atlantic," New Jersey Public Interest Research Group, Spring 2004, 22. [Hereafter cited as Algoso, "Renewables Work."]

ASE), British Petroleum, Fuji Electric, Kyocera, Mitsubishi, Sanyo, Sharp Electronics, Shell/Siemens, and Toshiba are expanding their renewable energy efforts.[36]

When compared to coal or natural gas, renewable energy technologies create more jobs per average megawatt (MW) of power generated, and per dollar invested in construction, manufacturing, and installation.[37] For example, compared to coal mining, wind and solar energy generate 40 percent more jobs per dollar invested.[38]

The Renewable Energy Policy Project (REPP), a nonprofit organization promoting the use and development of renewable resources, and funded in part by the U.S. Department of Energy (DOE) and the Environmental Protection Agency, conducted a study of the job growth that would result in New York State if the State adopted a renewable portfolio standard (RPS) that required 10 percent of New York's electricity to be purchased from renewable sources by 2005, and 25 percent by 2013. Considering only wind, solar, and biomass co-firing, the REPP calculated that by 2013, renewable energy production in New York would create 15,880 new jobs.[39] This figure represents only the direct jobs that could be created and does not reflect indirect job growth. The Office of the State Comptroller estimates that total job growth, including direct jobs, indirect jobs created in related industries, and job creation induced from expanded household spending, would be nearly three times greater—about 43,000 new jobs.[40]

Drawing on models developed by the New Jersey Public Interest Research Group, the REPP, and the Union of Concerned Scientists (UCS), this office estimates that a 25 percent annual increase in installed wind capacity in New York (a growth rate below current projections) would generate 5,462 direct jobs and 6,281 indirect jobs in New York. About 3,100 of the direct jobs would be manufacturing jobs and 2,000 would be year-long construction jobs. The remainder of the direct employment would be in maintenance and operations.

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36 *Clean Energy Trends 2003*, 4; Urenco Power Technologies, "Renewable Energy," http://www.uptenergy.com/eng/applications/renewablepower/ (accessed March 8, 2005); Urenco Power Technologies, "Case Study—Fuji Electric—Wind Power Application," http://www.uptenergy.com/eng/applications/renewablepower/casestudy/fuji.htm (accessed March 8, 2005); Worldwatch Institute, "Growing Political Support Powers Renewable Energy Into the Mainstream," press release, http://www.worldwatch.org/press/news/2004/05/12/ (accessed March 8, 2005); Sustainable Development International, "Shell Extends Clean Energy Push," http://www.sustdev.org/energy/Industry%20News/06.01/15.01.shtml (accessed October 6, 2004); and Rona Fried, "Solar Investments Start to Pay Off," *Tidepool*, October 31, 2003, http://www.tidepool.org/features/solar.cfm (accessed March 8, 2005).

37 Daniel Kamen, Kamal Kapadia, and Matthias Fripp, "Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Create?" University of California at Berkeley, April 2004, 12.

38 Singh, "Work that Goes into Renewable Energy," 4.

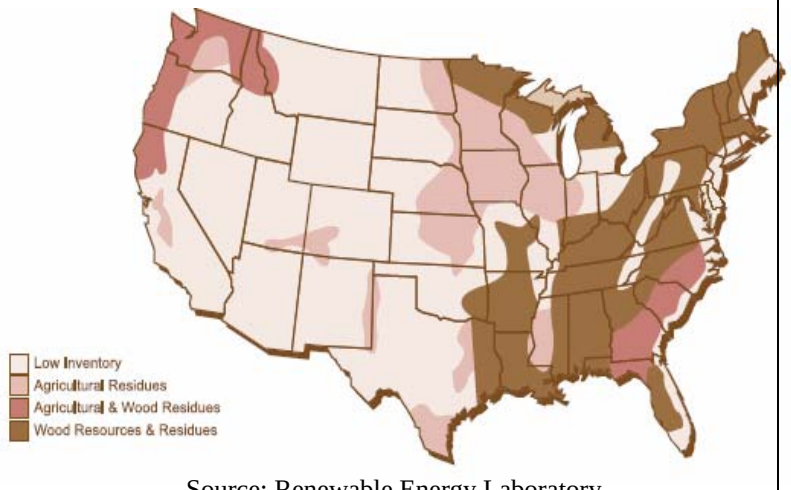
39 Renewable Energy Policy Project (REPP) for the Solar Energy Industry Association, "New York State RPS—Direct Job Analysis with PV Set-Aside," September 23, 2003, SEIA comments, 37, http://www.dps.state.ny.us/rps/03e0188_030926_comments/SEIA_comments.pdf.

40 Based on OSDC analysis and conversations with Prof. Geoffrey Hewings, Director, Regional Economics Applications Laboratory, University of Illinois.

C. Benefits to Farmers and Rural Communities

Yet another economic benefit from renewable energy is its ability to revitalize rural economies and provide added income for farmers. Wind, solar, and biomass energy can be used indefinitely, either to provide electricity to a farm or to generate new revenues. In particular, wind and biomass have the potential to provide significant added income.

Figure 1
U.S. Biomass Fuel Resources



Source: Renewable Energy Laboratory

The DOE has estimated that the development of dedicated energy crops for biopower generators could create more than 120,000 new jobs nationwide by 2012. Tripling the country's use of biomass energy from farm residues and energy crops would produce $20 billion in new income for farmers and rural landowners. [41]

Cultivation of energy crops offers an alternative to traditional farm crops. Energy crops are easier to grow, require far less work, improve the quality of the soil, and can be grown on land unable to support food crops.[42] In addition, these crops, which include fast-growing switchgrass and poplar and willow trees, do not require tilling, and thereby protect the soil from damage and erosion. (An average-sized corn farm that is replanted with energy crops could save 66 truckloads of soil from erosion each year.) These crops also have a deep root system, which enhances the structure of the soil (thereby preventing erosion), increasing the soil's organic content, and helping to filter chemical runoff from other farms before it can be deposited in waterways. Moreover, energy crops require far less fertilizer, pesticide, herbicide, and fungicide than traditional crops.[43]

In addition, biomass energy provides farmers and ranchers with an opportunity to save money by eliminating the cost of manure disposal. A dairy farm in Cortland County, New York, currently uses four microturbines to produce combined heat and power from methane

[41] Hopkins, *TrendsAlert: Renewable Energy*, 13.
[42] Union of Concerned Scientists (UCS), "Growing Energy on the Farm: Biomass Energy and Agriculture," https://www.ucsusa.org/clean_energy/renewable_energy/page.cfm?pageID=129 (accessed March 2, 2005).
[43] Ibid.

that is produced from the manure generated on-site. The heat is used to sterilize equipment, and excess power is sold to Niagara Mohawk. This efficient system avoids the need for, and expense of, manure disposal; it also provides heat and power to the farm at a low cost.[44]

Wind power also provides farmers with additional sources of revenue, as developers have begun paying farmers and ranchers to install turbines on their land—approximately $2,000 to $5,000 per turbine per year.[45] Each turbine takes up less than half an acre of space, and farmers can grow crops or graze livestock right up to the turbine's base. Thus, at a loss of only two to three acres of land, a farmer could earn between $8,000 and $30,000 a year in income depending on the number of turbines installed and the negotiated lease payments.

D. Increasing New York's Tax Base

Investment in renewable energy companies in New York State would do more than create jobs and revitalize rural economies; it would also provide a significant increase in tax revenue. According to the DOE, because utility-scale wind projects are generally more capital-intensive than conventional power plants, property tax payments for wind projects are often two to three times higher per unit of energy than payments from conventional power plants, and generally range from 1 percent to 3 percent of the project's value.[46] If calculated at the lower end of this spectrum (1 percent), property tax payments would equal roughly $10,000 per MW per year.[47]

Past projects in other states have produced large returns. Utilities and wind companies invested $1 billion in Texas in 2001 to build 912 MW of new wind power projects in the state.[48] The completed plants created 2,500 jobs with a payroll of $75 million, produced $13.3 million per year in tax revenue for schools and counties, and paid landowners $2.5 million in royalty income in 2002 alone.[49] Also in 2002, Navitas Energy in Illinois was given a $2.75 million state grant to develop a utility-scale wind farm. The project is expected to add $50 million to the local tax base.[50] A 20 MW wind farm in Wisconsin provides the local county with half of its total operating budget.[51]

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44 Pace Law School Energy Project, *Annual Report 2002/2003*, 4.

45 UCS, "Renewable Energy and Agriculture: A Natural Fit," http://www.ucsusa.org/clean_energy/renewable_energy/page.cfm?pageID=126 (accessed March 8, 2005).

46 EERE, U.S. Department of Energy, *Wind Energy for Rural Economic Development*, June 2004, 4, http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/wpa/33590_econ_dev.pdf.

47 EERE, U.S. Department of Energy, "Electricity from the Wind: Economic Development for Rural Communities," http://www.eere.energy.gov/windpoweringamerica/docs/economic_development.doc (accessed June 13, 2004) [hereafter cited as EERE, "Electricity from the Wind"]; and AWEA, "Wind Energy Fact Sheet," http://www.awea.org/pubs/factsheets.html (accessed March 8, 2005).

48 EERE, "Electricity from the Wind."

49 According to a report by the SEED Coalition and Public Citizen's Texas office, as cited in EERE, "Electricity from the Wind."

50 Dave Aftandilian, "Wind Energy: New Cash Crop for Farmers," Conscious Choice website, September 2002, http://www.consciouschoice.com/2002/cc1509/note1509.html (accessed March 8, 2005).

51 EERE, "Electricity from the Wind."

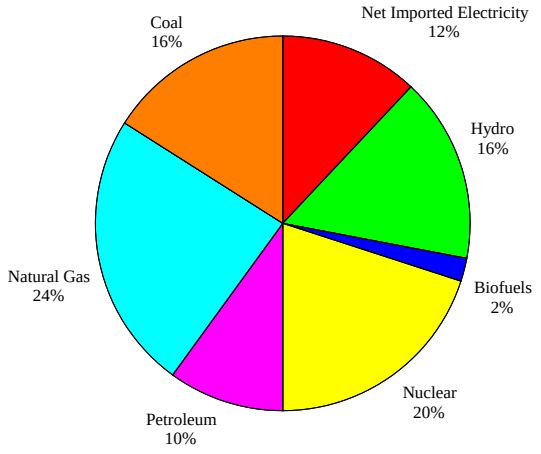
The UCS estimates that a national RPS of 20 percent could stimulate $80 billion in new capital investments, generate nearly $5 billion in new property tax revenue, and provide up to $1.5 billion in wind turbine lease payments to landowners.[52]

Increased tax revenue from renewable energy projects is not limited to wind power or property taxes. In the early 1990s, the U.S. biomass industry produced more than $1.8 million in personal and corporate income annually, and generated over $460 million in state and federal taxes.[53] An Albany-based fuel cell manufacturer employs over 300 New Yorkers, who have paid more than $6 million in state income taxes since 1999.[54]

E. Keeping New York's Energy Dollars In-State

In 2000, New Yorkers spent $15.7 billion purchasing electricity, of which 88 percent was produced in-state. Of the electricity generated inside the State, more than half was produced by bringing in out-of-state fossil fuels such as natural gas, coal, and oil.[55] By purchasing electricity and fuels from outside New York, a significant portion of the $15.7 billion spent on electricity in 2000 flowed out of the State.

Graph 3
New York's In-State and Imported Electric Generation by Source, 2000



Source: New York State Energy Research and Development Authority

Without the development of more renewable resources in-state, New York's energy plan projections suggest that this trend will continue as its reliance on natural gas, and eventually coal, increases. New York's natural gas and crude oil production capability is limited. Over the last 25 years, although the State has reduced its reliance on petroleum products as a share of total primary energy use, our reliance on foreign oil as a proportion of total petroleum has increased to 85 percent.[56] Projections included

[52] UCS, "Renewing Where We Live: What a National Renewable Energy Standard Means for the Midwest," http://www.ucsusa.org/documents/ACFknwerI.pdf (accessed March 2, 2005).

[53] Hopkins, *TrendsAlert: Renewable Energy*, 13.

[54] Renewable Energy Technology and Environment Coalition, "Initial Comments of Renewable Energy Technology and Environment Coalition," to the Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard, State of New York Public Service Commission, March 28, 2003.

[55] New York State Energy Research and Development Authority (NYSERDA), *2002 New York State Energy Plan and Final Environmental Impact Statement*, Section 1.1 and Section 2.2, June 2002, 1-8 to 1-9. [Hereafter cited as *2002 State Energy Plan*.]

[56] Ibid., Section 1.1, 1-8.

in the State Energy Plan released in 2002 show an increased demand for natural gas in all sectors through 2021, driven primarily by projected fuel requirements for the generation of electricity. At the same time, the demand for petroleum for the purposes of electricity generation is projected to decline significantly. This forecast assumes that coal use in the electric generation sector will decline in 2005, but will begin to increase thereafter in response to increased natural gas prices and the retirement of nuclear power plants.[57]

Investment in in-state sources of renewable energy would prevent dollars from leaking out of the State economy and would spur economic development and job growth. The development, installation, and maintenance of local power generators would add jobs, and if equipment suppliers—a source of high-wage manufacturing jobs—were located in New York, the potential for job growth would become even greater.[58] In the case of wind power, analysts predict that a portion of the manufacturing for wind farms will need to occur close to the installation sites, given the size of the turbines and towers used to generate wind power.[59]

[57] Ibid., Section 3.1, 3-6 to 3-9.
[58] Ibid., Section 2.2, 2-15.
[59] Algoso, "Renewables Work," 22.

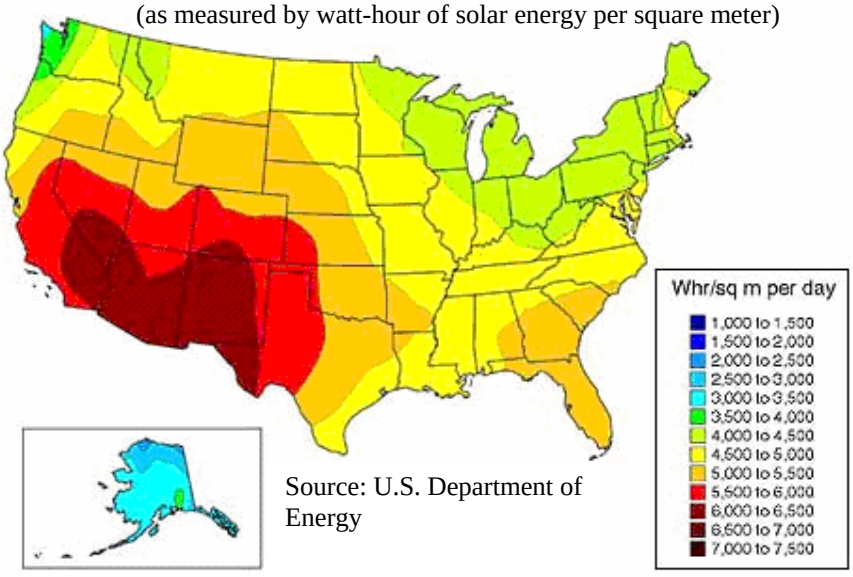
IV. New York State Resources

New York is well-suited to benefit from the expansion of renewable energy endeavors. While other states have pursued the sector more vigorously to date, New York has an abundance of natural and human resources appropriate for renewable energy development and is also home to cutting-edge research in fuel cells and photovoltaics (PVs). As state-sponsored programs continue to encourage consumers, including state and local governments, to purchase renewable energy, the stimulus for growth in the renewable energy sector in New York should increase.

A. Natural and Human Resources

New York State ranks 15th in the country for wind energy potential. It has roughly 5,000 MW of land-based potential, which is enough to provide 10 percent of the State's demand.[60] Offshore wind energy development in the waters south of Long Island could generate another 5,200 MW.[61]

Figure 2
U.S. Solar Resources
(as measured by watt-hour of solar energy per square meter)



Source: U.S. Department of Energy

While solar energy resources are more abundant in the Southwest region, most areas of the country, including New York State, receive at least 3,500 to 4,000 watt-hours of solar energy per square meter per day. This is enough sunlight to provide adequate power for average-sized homes that are equipped with solar roof tiles (see Figure 2).[62]

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60 AWEA, "New York State: Wind Energy Development," (see note 1); and DOE, "Wind Powering America: New York," http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/factsheets/fs_ny.pdf (accessed March 8, 2005).

61 AWEA, "Wind Power New York," http://www.awea.org/wpny/index.html (accessed March 2, 2005).

62 EERE, U.S. Department of Energy, "New York Solar Resources," http://www.eere.energy.gov/state_energy/tech_solar.cfm?state=NY (accessed March 2, 2005); and Hopkins, *TrendsAlert: Renewable Energy*, 23.

New York is the third-largest dairy producer in the country,[63] which makes the State well-suited to take advantage of growth in the biomass industry. The combined animal and agricultural waste produced by both large dairy farms and small family farms is considerable. Even without including the use of animal waste, the U.S. Department of Energy estimates that New York's biomass resources are sufficient to supply 31 percent of residential electricity use.[64] In addition, harvesting animal waste would not only provide a sustainable source of energy, but would also eliminate the expense and environmental impact of disposal. Furthermore, it would provide farmers and ranchers with yet another source of income.

In addition to energy resources, New York has a highly skilled workforce that can contribute to the renewable energy industry. Training in the specific skills needed by renewable energy companies is already developing and can be expanded. Moreover, significant reductions in high-tech and manufacturing jobs have created a large skilled but underemployed workforce that is well-suited to the renewable energy industry. The work of New York's institutions of higher education in the field of renewable energy will also contribute to the continued development of this workforce.

B. Research and Development

Several of New York's universities are conducting cutting-edge research and development—particularly in the area of fuel cells—and training the State's workforce in renewable energy fields. As the industry continues to grow, the market for a highly skilled workforce should expand rapidly, and New York's ability to meet that demand will become a critical element in attracting companies to New York.

Several branches of the State University of New York (SUNY) are conducting research in photovoltaics and fuel cell–related technologies. The State University at Albany's nanotech research site has become a global center for nanotechnology[65] development—a field that can be applied to the construction of solar cells and fuel cells—and works with more than 100 companies worldwide. Together with Plug Power, a fuel cell company located in Latham, New York, Albany Nanotech became one of the first research sites in the world to explore the incorporation of nanotechnology into the construction of fuel cells. Plug Power expects to sell fuel cell systems worldwide through a partnership with General Electric and DTE Energy Technologies.[66] Through continued cutting-edge research and collaboration with both the public and the private sectors, Albany Nanotech is helping to lay the

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63 New York State Department of Agriculture and Markets, press release, June 1, 2004, http://www.agmkt.state.ny.us/AD/release.asp?ReleaseID=1350.

64 U.S. Department of Energy, "New York Bioenergy Resources," http://www.eere.energy.gov/state_energy/tech_biomass.cfm?state=NY (accessed March 2, 2005).

65 Nanotechnology is the science of building devices at the molecular and atomic level (smaller than 100 nanometers).

66 *NanoInvester News*, October 10, 2002, http://www.nanoinvestornews.com/modules.php?name=News&file=article&sid=859.

groundwork for New York to become a competitive force in nanotechnology.[67] In addition, SUNY-Albany's Center for Advanced Technology in Thin Films is working with MTI Instruments, an Albany-based company, to develop sensors that could improve the efficiency and safety of fuel cells.[68]

The SUNY College of Environmental Science and Forestry (SUNY-ESF), located in Syracuse, has long been considered a leader in fuel cell and biomass research. SUNY-ESF has conducted over $12 million worth of research in biomass energy.[69] Scientists there are studying the reliability and feasibility of molten carbonate fuel cells, which operate on coal-derived fuels or natural gas, using one of only five carbonate fuel cells in the nation. They are also studying the integration of biomass with fuel cells. This occurs by using a gasifier to convert wood into biofuel, which is then used to power the fuel cell.

The Hydrogen Technology Learning Center at the Rochester Institute of Technology (RIT) conducts research on hydrogen-based power sources, and is one of four nationwide centers able to teach the latest advancements in fuel cell technology. Due to RIT's outstanding research capabilities and the number of skilled workers in the area, Rochester is well-suited to become a hub for fuel cell research and development. Delphi Energy and General Motors have already located fuel cell research centers in Rochester.[70]

The Southampton College of Long Island University has become a regional leader in promoting renewable energy and energy efficiency. Solar cells, wind turbines, and fuel cells operate around the campus and are incorporated into renewable energy research and instruction. Southampton College was chosen as a host site for DOE-funded research on state-of-the-art wind turbine blades, in part because of its success in integrating renewable energy instruction into the curriculum.[71]

SUNY-Farmingdale is the site of the first utility-scale photovoltaics project in the Northeast. The Farmingdale Solar Energy Center provides training in the installation and maintenance of PV panels, which is essential to New York's ability to expand the use of solar technologies.[72]

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67 Japanese Institute for Global Communications, Technology Bulletin, November 20, 2002, http://www.glocom.org/tech_reviews/tech_bulle/20021120_bulle_s9/.

68 Office of the Governor of the State of New York, press release, June 19, 2001, http://www.state.ny.us/governor/press/year01/june19_1_01.htm.

69 SUNY College of Environmental Science and Forestry, "SUNY Center for Sustainable and Renewable Energy," under "Specialized Research Units," *2004-2005 General Catalog,* http://www.esf.edu/catalog/resout.htm#rcomd; and "Fuel Cell Project Comes to SUNY-ESF," *News & Publications,* June 20, 2002, http://www.esf.edu/newspubs/news/2002/06.20.fuelcell.htm (accessed March 2, 2005).

70 Rochester Institute of Technology, "RIT Promotes Area as Fuel Cell Hotbed," *RIT News and Events* 36, no. 6 (November 6, 2003): 3, http://www.rit.edu/~930www/NewsEvents/2003/Nov01/NandE_Volume_36-06.pdf.

71 Long Island Power Authority, http://www.lipower.org/cei/wind.sc.html; and Southampton College, press release, May 10, 2002, http://www.southampton.liu.edu/news/pressrel/pr2002/turinsta.htm (accessed March 2, 2005).

72 SUNY-Farmingdale, Solar Energy Center, http://info.lu.farmingdale.edu/depts/met/solar/background.html (accessed March 2, 2005).

Rensselaer Polytechnic Institute (RPI) has installed a biplane tracking photovoltaic system, which is able to track the sun both horizontally and vertically, increasing the efficiency of PVs by 25 percent over stationary models.[73] RPI also works with the New York State Energy Research and Development Authority (NYSERDA) to connect researchers with investors and entrepreneurs, facilitating access to venture capital for successful innovations.[74]

General Electric (GE), which in 2002 undertook a $100 million renovation of its Global Research Center in Niskayuna, New York, recently announced plans to add 85,000 additional square feet of space as part of a $25 million expansion.[75] The center develops new technologies for GE's biosciences, nanotechnology, and renewable energy divisions, and according to company officials is expected to add 30 to 40 researchers over the next three years.

C. Private Efforts and Public Initiatives

New York State has a number of private companies active in the renewable energy sector. Currently, there are more than 170 businesses in this sector in New York State and 100 non-hydropower renewable energy–generating facilities. Of these facilities, 38 are biomass generators, 55 are grid-connected photovoltaic systems, and 7 are wind installations.[76] The three largest wind farms in New York are the Madison County Wind Power Plant, near Syracuse (producing 11.5 MW per year), the Wethersfield Wind Farm, in Western New York (producing 17 MW pre year), and the Fenner Wind Power Project, also near Syracuse (producing 30 MW per year).

The public sector in New York State has also made significant investments in renewable energy. NYSERDA announced in 2002 that it would provide more than $17 million for the development of five additional wind farms upstate. The total value of these wind farms is estimated to be more than $375 million. Combined, they will generate 315 MW of electricity, enough to power 315,000 homes.[77] NYSERDA has also supported a number of PV installations throughout the State. The Long Island Power Authority (LIPA) funded a study of the wind-development opportunities off the southern coast of Long Island, and found that the area has the potential to generate 5,200 MW—77 percent of Long Island's electricity needs.[78] LIPA is working on a power-purchase agreement to support the development of an offshore wind park capable of generating approximately 100 to 140 MWs of electricity.

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73 NYSERDA, "Renewable & Indigenous Energy R&D Program," http://www.nyserda.org/programs/Energy_Resources/photovoltaics.asp#successfull (accessed June 7, 2004).

74 *2002 State Energy Plan*, Section 2.2, 2-21.

75 Sara Clemence, "GE Research Center Plans $25M Expansion," *Times Union*, August 10, 2004.

76 Source Guides, http://energy.sourceguides.com/businesses/byGeo/US/byS/NY/NY.shtml (accessed July 23, 2004).

77 NYSERDA, "Governor Announces $17 Million for Five State Wind Farms," press release, August 20, 2002, http://www.nyserda.org/Press_Releases/press_archives/2002/governor/govaug20_02.asp.

78 Dan Zaweski, Director of LIPA's Energy Efficiency and Distributed Generation Programs, in a presentation to the Northeast Sustainable Energy Association, March 13, 2003, http://www.nesea.org/buildings/be/be2003/be03_proceedings_dan_zaweski.pdf.

V. State Incentives and Regulatory Support

Government support for renewable energy is essential to foster a hospitable environment in New York for companies in this industry. New York is encouraging the development of renewable energy through a wide variety of initiatives. In addition to introducing favorable regulatory changes, the State has provided renewable energy tax credits and loan, grant, and rebate programs.[79]

A. System Benefits Charge (SBC)

Primary funding for New York State's renewable energy programs comes from a System Benefits Charge (SBC) levied on customers of the six investor-owned utilities.[80] With electric deregulation in the late 1990s, the New York State Public Service Commission (PSC) set up a public benefit fund financed by the SBC to support energy efficiency initiatives, research and development, renewable energy programs, and subsidy programs for low-income customers, most of which are administered by NYSERDA. In 1998, the PSC set the SBC at $78 million per year for three years. In 2001, the PSC raised the charge to $150 million per year and extended the program through 2006. Total funding for the eight years will reach $932.1 million, including interest, by the end of 2006.[81] About 56 percent ($521 million) of the SBC funding supports energy efficiency programs; 12 percent (about $110 million) goes to renewable energy programs; and the balance is budgeted for payment assistance for low-income customers ($120 million), other research and development programs including distributed generation and combined heat and power ($101 million), and program administration, evaluation, and environmental disclosure ($81 million).[82]

Of the 22 states that have public benefit funds, New York has the third-largest fund. However, as a percentage of average annual utility revenues, New York's SBC amounts to only 1.3 percent of revenues, trailing 14 other states.[83]

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79 New York's initiatives are summarized in this section. For additional information, see the NYSERDA website, http://www.nyserda.org, and the Database of State Incentives for Renewable Energy (DSIRE) website administered by the Interstate Renewable Energy Council, which is funded by the U.S. Department of Energy and the North Carolina Solar Center, http://www.dsireusa.org/.

80 The six investor-owned utilities are Central Hudson, Con Edison, New York State Electric & Gas, Niagara Mohawk, Orange and Rockland Utilities, and Rochester Gas & Electric.

81 The initial three years of SBC funding amounted to $234.4 million, with $175 million assigned to NYSERDA programs and the balance allocated to the utilities to complete existing programs (primarily low-income and load-management programs) in their territories. The additional five years of funding, plus interest, brings the total NYSERDA-administered amount to $932.1 million.

82 NYSERDA, *New York Energy $mart Program Evaluation and Status Report: Report to the System Benefits Advisory Group*, 1 (2004): E34. [Hereafter cited as NYSERDA, *New York Energy $mart Program Evaluation (2004)*.]

83 The 14 states with funding rates higher than New York's (as a percentage of annual utility revenues) are: WI (4.3), CT (4.05), OR (3.5), VT (3.4), MA (3.06), CA (3.0), MN (2.59), NH (2.52), MT (2.4), RI (2.3), NJ (1.95), ME (1.85), TX (1.65), and AZ (1.45). (American Council for an Energy-Efficient Economy, "Summary Table of Public Benefit Programs and Electricity Restructuring," April 2004.)

B. NYSERDA Programs

Many of NYSERDA's SBC-funded programs are intended to develop both the wholesale and retail markets for renewable energy through support for research and development, innovative demonstration projects, wind power plants, end-use PV and wind power installations, distributed generation, education, outreach, training, and green-power marketing. Under the New York Energy $mart umbrella program, NYSERDA has offered successive time-limited programs to meet its goals. Some programs emphasize one particular technology while others cover multiple technologies. Most of the programs base eligibility on whether the prospective participant is a current customer of one of the State's six investor-owned utilities that collect the SBC. Customers of the New York Power Authority (NYPA) and the Long Island Power Authority (LIPA) are not eligible because they do not pay the SBC. However, both NYPA and LIPA have clean technology and renewable energy programs.

To support the wholesale renewable energy market, NYSERDA has worked to develop both the demand and supply for renewable energy. Programs have included incentives for energy supply companies to build wind plants in New York; funding for wind developers to find and develop optimal wind sites; support for research and development in renewable energy technologies; funding for a discounted loan program to promote renewable energy installations and energy efficiency efforts; support for developing tradable renewable energy credits; incentives for green-power marketing; and funding for education and outreach. NYSERDA has been instrumental in the development of two wind farms, the Madison facility and the Fenner wind farm, which together provide over 40 MW per year of wind power. Five new wind farms, designed to provide 315 MW of additional capacity, are planned for the next few years, although some are facing community opposition.

NYSERDA also works to develop the demand for on-site renewable energy, such as home or commercial PV installations, along with an infrastructure of skilled personnel who can meet this demand. The New York Energy $mart program has PV and wind incentive programs designed to stimulate both residential and nonresidential installations while also developing a network of eligible, accredited installers around the State. These programs provide rebates, received by the installer and passed on to the customer, which, according to NYSERDA, can defray 15 percent to 70 percent of the installation cost. Two pilot programs begun in 1998 have resulted in the installation of over 85 small PV systems, providing approximately 180 kW of power. NYSERDA has also supported the development and use of building-integrated PV systems, in which PVs are built into the structure of the building as it is constructed. NYSERDA reports that these programs are supporting PV systems on 11 new buildings with over 679 kW of capacity. Under a New York Solar Schools initiative, over 50 schools were selected for solar installations averaging 2 kW each, accompanied by related curriculum development. NYSERDA also provides technical assistance services for these

programs, to ensure high-quality installation.[84] Complementing these efforts, NYSERDA has also made significant efforts to promote the use of distributed generation and combined heat and power systems across the state. Furthermore, to promote the development of skilled and certified renewable energy installers, NYSERDA has supported training programs to create a nationally recognized certification and accreditation system.

C. Tax Credits

New York State offers personal, corporate, and property tax credits to stimulate renewable energy development. A personal income tax credit is provided for solar and fuel cell equipment installed on residential property, and a "green building" corporate franchise tax credit is offered for energy efficiency, solar, fuel cell, and daylighting expenditures. Property tax exemptions can be applied to solar, wind, and certain farm waste energy systems, wherein the property owner receives an exemption for 15 years from paying taxes on the increased value of the real property attributable to the renewable energy installation.

D. Regulatory Initiatives

In addition to providing funding and tax rebates to consumers and renewable energy producers, the State is working to update various rules and regulations to encourage the development of renewables. The State has also undertaken new initiatives that have the potential to stimulate growth in the renewable energy sector.

Renewable Energy Portfolio Standard

Many states have introduced a policy to promote the use of renewable energy—the renewable portfolio standard (RPS). Usually phased in over five to ten years, an RPS requires that a minimum percentage of a state's energy be drawn from renewable sources.

In September 2004, New York State took a significant step toward promoting renewable energy development by adopting an RPS. After Governor Pataki proposed a State RPS in January 2003, the PSC began the process of initiating one. Following more than a year and a half of hearings and testimony, with extensive participation from environmental organizations, energy companies, government bodies, individuals, and community representatives, the PSC voted to approve an RPS on September 22, 2004. The RPS sets a goal to obtain 25 percent of the electricity used in New York from renewable sources by 2013. The start date will be January 1, 2006.

All but 1 percent of the RPS goal would be met through a mandatory, incentive-based procurement program administered by NYSERDA, and the remaining 1 percent would come from New York's voluntary green-marketing program. The PSC established two tiers of

[84] NYSERDA, *New York Energy $mart Program Evaluation (2004).*

eligible resources: a main tier consisting of bigger generation facilities, including wind, hydroelectric, biomass, biogas, liquid biofuel, and ocean or tidal power facilities; and a second tier that will account for at least 2 percent of the overall goal, consisting of smaller, on-site technologies including photovoltaics, fuel cells, and small wind technologies. The PSC excluded most waste-to-energy facilities (i.e., municipal garbage incinerators that perform mass incineration of municipal solid waste) from eligible technologies at this time because they are too polluting.

The PSC estimates that New York State will need to add about 3,700 MW of renewable-resource generation capacity by 2013. Though the PSC order established a small charge on customers' electric bills, starting at the end of 2005, to help fund renewable resource development, cost impacts are expected to be minimal and costs may actually decline. For residential customers, the total cumulative cost impact over the life of the program could range from a decline of just under 1 percent to an increase of 1.68 percent, or about a dollar a month on an average customer's bill. For commercial and industrial customers, estimated cost impacts range from a decline of 1.54 percent to an increase of no more than 2.2 percent. As with the reduction of statewide air emissions,[85] the RPS implementation provides an important opportunity for New York State to promote the renewable energy industry within the State and to attract renewable energy–related businesses to the State.

Currently, 15 other states have renewable portfolio standards in place—Arizona, California, Colorado, Connecticut, Iowa, Maine, Maryland, Massachusetts, Nevada, New Jersey, New Mexico, Pennsylvania, Rhode Island, Texas, and Wisconsin. Three additional states—Hawaii, Illinois, and Minnesota—have voluntary goals or legislation similar to an RPS, but without enforcement provisions. While most of these RPS requirements were enacted between 1997 and 2002 and became effective between 1999 and 2003, Colorado, Maryland, and Rhode Island enacted their RPS statutes in 2004 (Colorado did so through a referendum passed in November of 2004).[86]

Executive Order 111

In 2001, Governor Pataki issued Executive Order 111, directing agencies and departments under executive authority, as well as public benefit corporations and public authorities (where the Governor appoints a majority of Board Members), to become more energy efficient and to increase their reliance on renewable energy.

Executive Order 111 seeks to increase energy efficiency in existing buildings by 35 percent, relative to 1990 levels, by 2010; to encourage the use of "green building" guidelines in future construction and substantial renovation projects; and to require the purchase of ENERGY

[85] The PSC projects that by 2013, the RPS will contribute to reducing statewide air emissions of nitrogen oxide (NOx) by 6.8 percent, sulfur dioxide (SO_2) by 5.9 percent, and carbon dioxide (CO_2) by 7.7 percent, with the greatest reductions occurring downstate.

[86] REPP, "Renewable Portfolio Standard," http://www.repp.org/rps_map.html (accessed March 2, 2005).

STAR energy-efficient products when replacing or buying new equipment.[87] The Executive Order also directs relevant agencies to purchase a larger share of renewable energy and increase their percentage of alternative-fuel vehicles.

The renewable-power procurement component of the Executive Order commits State agencies and other affected entities to purchase 10 percent of their power from clean, renewable energy sources by 2005, and 20 percent by 2010. (These percentages and dates for State entities should not be confused with those of the RPS, which pertain to the energy used by the entire state.) Eligible energy sources include wind and solar power, sustainably managed biomass (not including municipal waste incineration), tidal power, geothermal technology, and fuel cells.

To date, however, renewable power procurement by State entities has been slow. This may be the result of uncertainty regarding legal requirements. Executive Order 111 and the policy enunciated under the Energy Law appear to permit a preference for energy generated from renewable sources, even if this energy is more expensive. The State Finance Law, however, generally requires that all commodities, including energy, be purchased on the basis of the lowest price offered by a responsible bidder. Legislative clarification of the ability of State entities to grant a preference for renewable-sourced energy is needed.

Net Metering

Net metering allows customers who use distributed generation systems to sell excess power back to the utility at retail prices. In 1997, New York State introduced net metering for small residential solar systems of 10 kW or less, and in 2002 expanded net metering to include farms with biogas-fueled power generators of 400 kW or less. Customers with small renewable energy systems can connect them to the electric grid so they can draw on utility power when needed or sell home-generated power back to the utility when they have an excess. Using net metering, the customer's electric meter runs backward when supplying excess power to the utility. Since the customer only pays for the net balance, net metering helps to offset the costs of small renewable energy systems. In 2004, legislation was enacted to extend net metering to small wind facilities in New York—up to a limit of 25 kW for residential systems, and 125 kW for farm-based systems. Commercial customers are currently ineligible to participate in net metering.

Net metering provides a simple, low-cost method of stimulating the purchase of small renewable generation systems. Using a single meter simplifies administration, and photovoltaic systems provide additional power at precisely the times it is most needed—during the summer peak-demand periods. Though net metering has been introduced in New York and many other states, it does not cover all relevant distributed generation systems, and

[87] ENERGY STAR products and appliances meet or exceed federal energy-efficiency and quality guidelines without sacrificing performance.

significant barriers to distributed generation still exist in the form of interconnection obstacles and costs imposed by the utilities.[88]

Environmental Disclosure

As part of the deregulation process for electric companies in New York, customers can now select the companies from which they purchase electricity. To promote clean energy and provide consumers with additional information about energy companies operating in the state, New York introduced environmental disclosure requirements in 1998.[89] Under these rules, electric suppliers must disclose the fuel sources they use in producing electricity, along with their emissions of key air pollutants, in a biannual statement to customers. As with food-labeling requirements, environmental disclosure rules promote consumer choice. In creating this program, the PSC stated that its goal was to "facilitate informed customer choice, which could, in turn, lead to improved environmental quality and resource diversity."[90] Disclosure is expected to bolster the demand for clean, renewable energy. Similar requirements have been introduced in 24 other states to date.[91]

Solar Easements

New York State property owners can preserve their access to wind or sunlight by obtaining the grant of an easement. In addition, in appropriate circumstances, local zoning ordinances may prescribe rules regarding solar access.[92]

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88 Yih-huei Wan, "Net Metering Programs," National Renewable Energy Laboratory, 1996; DSIRE, New York State section, under "Net Metering Rules," http://www.dsireusa.org; and UCS, "Clean Energy: Net Metering," http://www.ucsusa.org/clean_energy/renewable_energy/page.cfm?pageID=104 (accessed March 2, 2005).

89 In 1998, the PSC issued an order requiring electric suppliers to disclose the fuel mix (i.e., percentages of coal, oil, nuclear power, biomass, solar power, wind power, etc.), used to produce their electricity, and their emissions of sulfur dioxide, nitrogen oxides, and carbon dioxide.

90 PSC, "Environmental Disclosure: A Consumer Guide," http://www.dps.state.ny.us/EDLbrochure.htm (accessed March 2, 2005).

91 Ibid.; and DSIRE, New York State section, bottom menu, under "Summary Tables," http://www.dsireusa.org (accessed September 22, 2004).

92 *2002 State Energy Plan*, Section 3.3, 3-57.

VI. Obstacles to Industry Growth

The outlook for renewable energy development in New York is promising and the potential for economic development gains from increased investment in renewable energy is encouraging, but obstacles must still be overcome in order to realize these gains. Some obstacles can be addressed through public policy, while others are beginning to dissipate as the industry grows.

A. Current Financial Climate

In the post-Enron energy environment, financial uncertainty has hindered the availability of funding for new power-generation facilities (regardless of whether those facilities will generate traditional or renewable energy). Renewable energy facilities face additional financing challenges because of higher initial capital costs per kWh and because financial institutions and insurers demand a premium for less familiar technologies. Encouraging public entities to purchase power from renewable energy sources may be central to overcoming financial obstacles. However, policies designed to stimulate the market for renewable energy, such as the New York State Renewable Portfolio Standard (RPS), need to be complemented by policies that lower the financing hurdles to such development.

B. Regulatory Issues Concerning Distributed Generation

In order to ensure the smooth implementation of the RPS and to encourage investment in renewables, barriers to the deployment of distributed generation (DG) systems need to be addressed. Most users of small DG systems—solar and wind power, biomass, and fuel cell generators—choose to connect to the electrical grid to draw on utility-supplied electrical power to supplement their systems, and to sell excess power back to the utility when available. However, these users can face costly regulatory requirements in the form of interconnection procedures, connection tariffs, and standby charges imposed by the utilities. Also, not all relevant DG systems are currently eligible for net metering.

Standby charges are costs that utilities charge small producers in order to keep capacity "standing by" in case the DG owner needs supplementary power. Standby charges are typically flat monthly fees determined by the customer's past maximum usage in a given period. In New York State, these charges currently range from $4 to $16 per kW per month, depending on the type of customer (commercial or residential) and the utility involved.[93] The utilities argue that standby charges must be flexible to reflect a variety of factors, including: the location of the DG system, the reliability of the DG technology used, and the quality and maintenance of each DG installation. The PSC is currently reviewing these charges to ensure that they are reasonable and consistent across the State.

[93] Andrew Geott, "Prospects for Distributed Electricity Generation," Congressional Budget Office, September 2003, 25.

C. Net Metering Limits

Net metering, which can defray some of the cost of DG systems by obtaining retail prices for excess power sold back to the utilities, was extended to wind power through recent legislation, enacted September 14, 2004. However, net metering is still not available to businesses and various other DG systems. In addition, New York's existing limits on net-metered systems—up to 10 kW for solar systems, 400 kW for farm-waste systems, 25 kW for residential wind systems, and 125 kW for farm-based wind systems—renders many systems ineligible. Both California and New Jersey allow large systems to participate in net metering, contributing to the strong presence of those states in the photovoltaics industry.[94] Some utilities have expressed concern that raising the limit on net-metered systems would adversely affect the stability of the grid. However, the cap for net metering in California is 1 MW—100 times the current cap for PV systems in New York—and New Jersey has just increased its cap to 2 MW.

D. New York State Localities' Purchasing Contracts

Several localities have contracted with renewable energy producers. The State Assembly unanimously passed legislation last year that would allow localities to purchase renewable energy for a "reasonably competitive" price—which could be up to 15 percent higher than the price for nonrenewable energy.[95] A companion bill was introduced in the State Senate, and the Office of the State Comptroller issued a memo in support of its passage.[96] Enactment of this legislation will serve to encourage localities to purchase renewable energy and improve New York's progress toward meeting the RPS requirement.

E. Purchase of Renewable Energy by New York State Agencies

Though Executive Order 111 commits State agencies to purchase 10 percent of their power from renewable sources by 2005 and 20 percent by 2020, the Office of the State Comptroller, which reviews the procurements of State agencies, has witnessed minimal contracting activity by State agencies concerning renewable energy purchases.

Lack of clarity in the legal framework in which State agencies can purchase renewable energy may be contributing to this; however no legal obstacles have been identified that prevent State agencies from purchasing renewable energy. Clarity is needed to encourage agencies to comply with this order, and the Office of the State Comptroller makes recommendations to this effect in Section VII, "Recommendations."

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94 Because of slim profit margins in the PV business, PV installers prefer to focus on larger systems in order to make a reasonable profit.

95 New York State Assembly Bill 10421 of 2004.

96 Alan P. Lebowitz, General Counsel of the Office of the State Comptroller, letter to Senator Hoffmann, June 21, 2004.

F. Price Disparities between Fossil Fuels and Renewables

While energy from renewable sources is generally more expensive than energy from traditional sources, the price disparities have been distorted. Traditional sources of energy have been heavily subsidized and given federal tax breaks. Additionally, environmental and health costs associated with plant emissions have been shifted onto society as a whole and not factored into the price of fossil fuels. As a result, the cost of fossil fuels appears lower than it is because individual consumers are allowed to purchase nonrenewable energy at an artificially low price, while the full cost of its use is passed on to the public in the form of public subsidies and increased health care and environmental costs. As renewable energy technologies receive more government support, the cost disparity between traditional and renewable technologies will narrow.

G. Lack of National Leadership

Many states have begun to address the need to invest in renewable energy and implement regulatory initiatives such as RPSs, but these efforts have not been matched on the federal level. Other nations, most notably Canada, Germany, and the Netherlands, have undertaken ambitious initiatives to increase the production and use of renewable energy. Currently, 19 states, including New York, have adopted RPSs. In June 2004, nine western states signed an agreement committing the region to developing 30,000 MW of electricity from renewable resources by 2015. In marked contrast, the federal government has failed to adopt any mandatory standards for the use of renewable energy. The U.S. Department of Energy did announce a nonbinding goal of obtaining 5 percent of U.S. electricity from wind by 2020, which could be achieved at the current rate of growth nationwide.[97] According to Battelle Pacific Northwest Laboratory, a federal research lab, wind energy could potentially supply about 20 percent of the nation's electricity demand.[98]

In addition to the lack of a national agenda for renewable energy, the fate of important federal tax credits related to renewable energy—such as the Renewable Energy Production Tax Credit (PTC) that expired in 2003—has been tied to the omnibus Federal Energy Policy Act ("the Energy Bill"). Environmental advocates contend that the Energy Bill would weaken the Clean Air Act and the protection of coastal areas, continue significant subsidies for traditional energy sources, and weaken the Superfund Program.[99] Since agreement on the Energy Bill has been stalled for months, a provision extending the PTC was incorporated into the Family Tax Credit Bill (HR1308), which was enacted October 4, 2004. While the PTC provision extends the tax credit retroactively from its expiration until the end of 2005, the

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97 EERE, U.S. Department of Energy, "Wind Powering America: America's Wind Power, A National Resource," http://www.eere.energy.gov/windandhydro/windpoweringamerica/ (accessed March 8, 2005).

98 AWEA, "Wind Energy Potential," http://www.awea.org/faq/tutorial/wwt_potential.html (accessed March 2, 2005).

99 Sierra Club, "Sierra Club Blasts Energy Policy Act," http://www.sierraclub.org/globalwarming/bush_bill.asp; and Gregory Wetstone, Natural Resources Defense Council, "America's Future Under the Energy Bill: More Polluted, Less Secure," press statement, November 17, 2003, http://www.nrdc.org/media/pressreleases/031117.asp (accessed March 2, 2005).

uncertainty created by the initial expiration had a dampening effect on wind power investments in 2004. Advocates originally sought a three-year extension until the end of 2006, and they are likely to seek an extension beyond 2005.

H. Siting Concerns

As with all major development projects, particularly those involving power plants, large-scale renewable energy projects have faced some opposition from residents and property owners in the areas in which they have been proposed. Opposition has been based primarily on aesthetic concerns. The proposed construction of a wind farm off of the south shore of Long Island has generated both support and opposition from the community, as have the NYSERDA-sponsored wind farm projects in both Chautauqua and Steuben counties. However, wind farms have often seen initial opposition give way to support as people become familiar with the technology and discover its low impact on both the landscape and noise levels.[100] In all development projects the concerns of area residents must be weighed against their economic, and in this case environmental, benefits.

Prior to its expiration at the end of 2002, a review process for siting generation facilities with a capacity of 80 MW or more was set forth in Article X of the New York State Public Service Law. A renewal of Article X would provide for the disclosure and debate of concerns about construction and operation of larger-scale renewable energy projects, and also, as previously designed, guaranteed opportunities for public involvement. In addition to the requirement that those entities applying to construct generating facilities must carry out a meaningful public involvement program, Article X provided for the creation of an intervenor fund for each project. Proceeds from the intervenor funds were distributed to municipal and other local parties to help defray the expenses of expert witnesses and consultants.[101] Both the Assembly and Senate have passed measures to reinstate the review process, but the two houses have not reached agreement. It is important that an Article X process of environmental review for electric-generating facilities be reinstated in New York State.[102]

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[100] The two existing wind farms in Madison County have earned community support since becoming operational, and a 2003 survey conducted in Scotland found that people living near the ten largest wind farms in the region strongly support wind energy; 82 percent favor an increase in wind production, and 54 percent support an increase in the number of turbines at their local wind farm.
(AWEA, Wind Power Outlook 2004, http://www.awea.org/pubs/documents/Outlook2004.pdf).

[101] PSC, Guide to Certification Review Process under Article X, under "Introduction," http://www.dps.state.ny.us/articlex_process.html#intrduction.

[102] All of the current renewable energy–generating facilities in New York, and those planned for Steuben and Chautauqua counties, have a capacity of less than 80 MW, and therefore would not be subject to Article X review. However, a larger project, such as LIPA's proposed offshore wind farm, would fall under a renewed Article X process.

VII. Recommendations

Ongoing technical innovations and market expansion are lowering the cost of renewable energy materials and manufacturing. However, as with most emerging technologies, government support remains crucial. As other states adopt programs to encourage the development of renewable energy resources, the need for New York State to foster a hospitable environment for renewable energy becomes more important. While any allocation of resources must be balanced against competing needs, existing programs should be expanded as resources allow.

Reduced costs will not be enough, in the immediate future, to create a mass market for renewables. The key to stimulating growth related to renewable energy in New York is the development of consistent, guaranteed, and increasing markets for in-state renewable energy producers. By making legislative changes, removing regulatory impediments to industry growth, requiring that a percentage of our energy supply come from renewable sources, and expanding and restructuring renewable energy incentives, New York could see significant positive economic results.

The Office of the State Comptroller Recommends a Four-Part Proposal to Structure a New Market for Renewable Energy

1. Recommended Legislative Action

Pass Senate Bill S.898

The State Senate should join with the Assembly to pass an amendment to the general municipal law to allow municipalities to purchase renewable energy at up to a 15 percent premium compared to conventional sources. Municipal renewable energy purchases will help to build the market for renewables, and are also necessary to fulfill the recently adopted Renewable Portfolio Standard (RPS) that requires 25 percent of the State's energy to come from renewable sources by 2013. The Assembly passed a similar bill during the last legislative session. Upon its passage, the Governor should sign this bill into law.

Codify Executive Order 111 in Statute

To promote the implementation of Executive Order 111, the Office of the State Comptroller recommends consideration of the following legislative changes to facilitate the purchase of electricity from renewable sources by State agencies.

- Energy Law Section 3-103 could be amended to supercede State Finance Law (SFL) Section 163, and to provide for State agencies to purchase a certain percentage of their energy supply from renewable sources—thereby providing

State agencies with clear authority to procure a portion of their energy needs in procurements open only to renewable sources.

- SFL Section 165 could be amended to allow for a pricing preference for renewable energy, similar to the existing preference for recycled and remanufactured goods.

The Governor and Legislature should determine which approach best meets the needs of State entities and enact appropriate legislation.

Pass Legislation Increasing the Cap on the Size of Net-Metered Systems and Allowing Business Distributed-Generation Systems to Participate in Net Metering

For the past two years, the State Assembly has passed legislation that increases the cap on net metering in New York to 1 MW. Last year, a majority of State Senators were cosponsors of the Senate version of the bill, but it failed to leave the Energy and Telecommunications Committee. This bill should be brought before the full Senate for a vote.

On September 14, 2004, the Governor signed into law legislation extending net metering to include wind power.[103] However, net metering should also be extended beyond residential and farm systems to include commercial systems.

Pass Legislation Implementing an Article X Review Process for the Siting of Electric Generating Facilities

Siting disputes may stand in the way of the development of larger renewable energy-generating facilities, and community opposition may serve as a disincentive to private investment in these technologies. The process employed by New York State to review proposed generating plants that are designed to produce 80 MW or more of electricity expired in December 2002. The Article X review process provided a forum in which concerns about siting decisions could be addressed, including funds for community groups and other groups to engage experts and study the issues. Both houses of the Legislature have considered legislation to reinstate the process, with some revisions, but agreement has not been reached. The Assembly passed legislation that incorporated meaningful reforms for improving the Article X process, including improvements in the consideration of community concerns. Both houses should work together to pass legislation, and then send it to the Governor to be signed into law.

[103] Of the 30 states with net metering, New York was the only state that did not include wind power in its net-metering provisions.

Codify the Renewable Portfolio Standard in Law

The PSC recently adopted an RPS that sets a goal of obtaining 25 percent of New York's electricity from renewable sources by 2013. The Office of the State Comptroller applauds this decision. In addition to environmental benefits from reduced statewide air emissions, the RPS provides a great economic development opportunity for the State. Following the momentum of the recent approval, it is appropriate to ratify the RPS as a law of the State, with responsibility for implementation resting with the PSC.

2. Recommended Regulatory Action

Reduce Interconnection Procedures and Costs for Distributed Generation (DG)

Renewable energy producers are faced with a number of regulatory requirements for connecting to the electric grid. In 2000, the National Renewable Energy Laboratory conducted a study, which included case studies in New York, that found that "a variety of technological, business practice, and regulatory barriers discourage interconnection in the U.S. domestic market. These barriers sometimes prevent distributed generation projects from being developed."[104] As the PSC evaluates revisions to New York's interconnection requirements and standby charges, a special effort should be made to lessen these hindrances and ensure that standby charges reflect both utilities' actual costs and economic benefits to the system. In addition, some routine connection requirements may no longer be necessary because of technological advances in localized power generators, and should be eliminated.

Make DG-Related Connection Tariffs More Predictable

Currently, connection tariffs are subject to change, which does not allow DG operators to plan their expenses or to maintain a stable outlook on the future energy market. Establishing more predictable tariffs would provide investors with greater certainty about the costs involved in their projects, making projects less risky and encouraging investment in DG.

Encourage PSC Mediation of DG-Related Disputes

Adding DG systems to electrical grids can sometimes require upgrading the transmission and distribution system, although generators and utilities do not always agree on whether the upgrades are necessary. The PSC should settle these disputes as quickly as possible, and ensure that prospective energy providers are not required to perform more work than is necessary, or incur undue expense.

[104] R. Brent Alderfer, Thomas Starrs, and M. Monika Eldridge, "Making Connections: Case Studies of Interconnection Barriers and Their Impact on Distributed Power Projects," National Renewable Energy Laboratory, July 2000, ii.

3. Promote Development of the Renewable Energy Industry

Institute Economic Development Initiatives in Connection with New York's RPS

The Office of the State Comptroller encourages NYSERDA and all other relevant parties involved in implementing the RPS to engage in economic development outreach while promoting renewable energy development in the State. Working with NYSERDA and the PSC, the Empire State Development Corporation should structure a program to encourage growth of the renewable energy industry in New York State. Targeted outreach should include promotion of the State's tax incentives, talented labor force, and natural resources. Efforts should be made to encourage renewable energy suppliers to locate their manufacturing and assembly plants in New York State, and to both increase and highlight the availability of related components manufactured in-state. Such an initiative also could provide developers of renewable energy resources with information about locally based and State-certified photovoltaic and wind turbine installers, as well as information about New York firms with other specialties relevant to the renewable energy industry.

Increase Collaborative Efforts with Local Governments

Thousands of brownfields (properties where redevelopment or reuse may be complicated by the presence of a hazardous substance or contaminant) are located across the State. Some of these properties could be used without extensive remediation to support solar arrays, wind turbines, or biomass plants. The State should work with local governments where brownfield sites are located to determine their suitability for renewable energy generation, and to facilitate related development as appropriate. The city of Chicago has done this already by covering a former brownfield site with solar panels and converting it into a power generator; this successful project could be used as a model.

Support Workforce Education and Training

If New York is to maximize the economic benefits of the expanded use and production of renewable energy, the State must have locally based companies able to install and repair renewable energy systems. To prepare our workforce for careers in this expanding industry and in order to avoid hampering growth through a lack of skilled workers, the State should continue to support education and training in these fields.

Continue Support for Research and Development

Support for research on renewable energy at New York's colleges and universities should be continued, including support for renewable energy–related centers for excellence. In particular, SUNY-Albany, SUNY-ESF, and the Rochester Institute of Technology are engaged in cutting-edge fuel cell research that has already attracted businesses to collaborate

on research, and taken advantage of the universities' skilled workforces. However, other states, such as California, Connecticut, and Michigan, are making efforts to corner the fuel cell industry by investing more heavily in research and development centers—for example, Michigan recently launched a $50 million program with the aim of making that state the leading developer of fuel cells for the transportation sector.[105] For New York to be competitive with these states, we must continue to devote resources to research and development at our universities.

Consolidate Information about Renewable Energy Policies and Programs

The State should seek to develop a single source for information about programs and policies that encourage the use of renewable energy and the growth of the industry. New York has taken important steps to support the growth of renewable energy resources. These efforts should be showcased and made accessible to individuals and businesses through a single source.

4. Maximize the Benefits Derived from Funding and Tax Incentives that Support the Growth of the Renewable Energy Industry

Review Systems Benefit Charge (SBC) Expenditures to Ensure Effective Use of Funds

The Office of the State Comptroller will initiate an audit of the SBC to provide objective insight into how proceeds from the charge are used. In September 2004, the Chairmen of the Assembly Committee on Energy and the Committee on Corporations, Authorities and Commissions requested from the PSC and NYSERDA an explanation of the seemingly inappropriate use of proceeds from the SBC.[106] Specifically, the Assembly members expressed concern that sponsorship of political convention coverage on cable news stations was part of the *New York Energy $mart* program.

The goal of the audit will be to identify ways in which SBC proceeds are being employed effectively, as well as opportunities to improve the use of these funds. To the degree the audit identifies ineffective employment of SBC proceeds, it will create the opportunity for funds to be redirected or better used to support New York's renewable energy programs.

The current SBC expires in 2006. The expiration of the current regulations governing the SBC should be cause for making statutory changes to establish better accountability and transparency for the use of SBC funds.

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105 *Clean Energy Trends 2004*, 6.

106 Assemblyman Paul D. Tonko and Assemblyman Richard L. Brodsky, letter to William Flynn and Peter Smith, September 2, 2004.

NYSERDA Initiatives

Low-cost financing for both residential and commercial renewable energy installations is essential for their continued development. The Office of the State Comptroller recommends continued support for discounted loan programs since the predominant barrier to greater use of renewables is the lack of access to financing.

The Office of the State Comptroller endorses NYSERDA's varied efforts to support research and development, wind power, and residential and commercial use of photovoltaics (PVs). We also encourage raising the eligibility limit for small-building PV incentives to at least 50 kW—a change already under consideration. These steps would reduce installation costs associated with PV systems, further encouraging their use.

It is important that this public authority make every effort to ensure that its funding is used effectively. Though NYSERDA has established meaningful programs, its ability to carry out its mission could be enhanced as a result of stronger corporate governance, improved procurement practices, and increased transparency of its operations. The State Legislature should pass the Authority Reform proposals put forth by Comptroller Hevesi and Attorney General Spitzer to increase the accountability of all public authorities, including NYSERDA.

Review Existing Tax Incentives

In addition, the State should review existing tax credits to ensure that solar, wind, biomass, and fuel cell technologies are eligible, where appropriate, for personal, property, and corporate tax exemptions. Where exemptions are provided, the State should ensure they are achieving their intended purpose and adjust tax policies as necessary.

Glossary

AWEA: American Wind Energy Association, a national trade association that represents the wind industry.

Baseload: The lowest level of power production needed during a season or year. A baseload unit or generating facility is one that is intended to run constantly at near capacity levels, as much of the time as possible.

Biodiesel: A biodegradable transportation fuel for use in diesel engines. It may be used either as a replacement for or a component of diesel fuel.

Biofuels: Liquid fuels and blending components produced from biomass (plant) feedstocks, used primarily for transportation.

Biogas: A gas containing methane and carbon dioxide, resulting from the action of microorganisms on organic materials, such as in a landfill.

Biomass: Plant and animal matter that can be used to produce energy.

Building-Integrated Photovoltaics (BIPV): The integration of photovoltaics (PV) into a building's "envelope," such as the roof or facade. The PV modules serve the dual function of providing the "skin" of a building—replacing conventional building surface materials—and generating power.

Co-firing: The process of burning natural gas in conjunction with another fuel to reduce air pollutants.

Cogeneration or **Combined Heat and Power (CHP):** The production of electricity and heat (or steam) from a single energy source.

Combined Heat and Power (CHP): See Cogeneration.

Distributed Generation (DG): The manner by which electricity from small power generators—such as photovoltaic roof systems, small wind systems, or some single-building combined heat and power systems—is provided. Distributed generation systems are located at the point of use and can be either stand-alone or grid-connected systems.

Electrical Grid: The electrical distribution system.

Ethanol: A clear, colorless, flammable oxygenated hydrocarbon. Ethanol is typically produced either chemically from ethylene, or biologically from fermentation of various

sugars in carbohydrates found in agricultural crops and cellulosic residues from crops or wood. Ethanol can also be used in high concentrations in vehicles designed for its use.

Fossil Fuels: An energy source formed in the earth's crust from decayed organic material. Common fossil fuels are petroleum, coal, and natural gas.

Fuel Cell: A device which produces electricity with high efficiency (little heat) by converting the chemical energy of a fuel directly into electrical energy.

Gasifier: A device used to convert biomass into a gas that can be burned to generate power.

Generation: The process of producing electric energy from other forms of energy; also, the amount of electric energy produced, expressed in watthours (Wh).

Geothermal Energy Technologies: The use of heat from the earth in the form of steam or hot water for direct-use applications, geothermal heat pumps, and electrical power production.

Grid: The layout of an electrical distribution system.

Kilowatt (kW): 1,000 watts of electricity.

Kilowatthour (kWh): 1,000 watthours of electricity. Kilowatthour is the basic unit of electric energy equal to 1 kilowatt of power supplied to an electric circuit steadily for 1 hour (equivalent to about 3,412 Btu [British thermal units]).

LIPA: Long Island Power Authority.

Megawatt (MW): One million watts of electricity.

Megawatthour (MWh): 1,000 kilowatthours or 1 million watthours.

Methane: A colorless, flammable, odorless hydrocarbon gas (CH_4), which is the major component of natural gas. It is also an important source of hydrogen in various industrial processes. Methane is a greenhouse gas.

Microturbine: New type of combustion turbine for use in stationary energy generation applications. About the size of a refrigerator, microturbines produce 25 kW to 500 kW of energy and can be located on sites with limited space for power production.

Municipal Solid Waste (MSW): Residential solid waste and some nonhazardous commercial, institutional, and industrial wastes.

Net Metering: A legally established method of metering that allows a home or business with its own renewable energy generator, such as a wind turbine or solar panels, to sell excess power produced back to the electric utility. Under net metering, excess electricity produced by the wind turbine will spin the existing meter backwards, thus providing the customer with the full retail value for the electricity produced.

NYPA: New York Power Authority.

NYSERDA: New York State Energy Research and Development Authority.

NYISO: New York Independent System Operator, the organization responsible for operating New York State's bulk electric system and administering its wholesale electricity markets.

Peak Demand: The maximum electric demand or load during a specified period of time.

Photovoltaic (PV) Cell: An electronic device consisting of layers of semiconductor material, such as silicon, capable of converting sunlight directly into electricity (direct current).

Photovoltaics (PV): Devices and power systems that use photovoltaic cells to convert sunlight directly into electricity. The term comes from "photons" (light) and "voltage" (electricity).

PSC: New York State Public Service Commission.

Renewable Portfolio Standard (RPS): A legal mandate that requires that renewable energy sources be used to meet a minimum percentage of a state's total electric demand.

Solar Cell: Another name for a photovoltaic cell.

Solar Energy: The radiant energy of the sun, which can be converted into other forms of energy, such as electricity or heat.

System Benefits Charge (SBC): A specific charge added to a consumer's electric bill that is used to fund energy efficiency programs, low-income energy programs, and renewable energy development.

Watt (W): The unit of electrical power equal to 1 ampere under a pressure of 1 volt. A watt is equal to 1/746 horsepower.

Watthour (Wh): The unit of measure of electrical energy equal to 1 watt of power supplied to, or taken from, an electric circuit steadily for 1 hour.

Wind Energy: Energy present in wind motion that can be converted to mechanical energy for driving pumps, mills, and electric power generators.

Glossary Sources:

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