

DRAFT NEW JERSEY ENERGY MASTER PLAN

Executive Summary

APRIL 2008



State of New Jersey

OFFICE OF THE GOVERNOR
THE STATE HOUSE
PO BOX 001
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JON S. CORZINE
GOVERNOR

April 17, 2008

Dear Citizens of New Jersey,

New Jersey's economy depends on a reliable supply of energy at a reasonable price. Surveys of the business community in our state repeatedly show that high energy costs weigh against decisions to locate, retain or expand businesses here.

The production, distribution and use of energy also affect the quality of our environment. Air pollution from burning fossil fuels to generate electricity, to heat our homes, and to support our businesses and industries, and run our transportation systems jeopardizes the health of our residents and contributes to global warming.

Energy's critical role in our economy and our environment is nothing new. Since the oil shocks of the 1970s, energy challenges have repeatedly awakened us to our growing demand for energy and regional and global competition for supply, resulting in vulnerability to high prices, supply shortages, and environmental damage.

Today we face a different energy crisis. This crisis is not as sudden or as visible as the gas lines of the 1970s. Instead, we face a steadily growing threat to our economy, our household budgets, our environment, and our quality of life. It is unfortunately tempting to become accustomed to, and accept, electricity bills that continually increase, home heating bills that periodically spike, and droughts, floods, and heat waves that gradually become more frequent over time.

Since the 1970s, the State has periodically published Energy Master Plans. However, this Plan must be different. It must set the course for correctly identifying the energy problems that we face, for developing the right solutions, and for taking the actions that make those solutions a reality. This Energy Master Plan, once implemented, must enable New Jersey to overcome the many energy and environmental challenges that have emerged and to regain firm control of our energy destiny over the next decade.

That has become apparent since October 2006, as residents, the business community, environmental advocates, consumer advocates, local governments, and other stakeholders invested their time and effort to help to lay the foundation and identify the challenges for this draft Energy Master Plan.

We cannot afford to ignore these challenges. We cannot afford to wait and hope that somebody else will address them for us. We cannot pretend that the major steps we have already taken to reduce our energy use and to expand renewable energy sources will be sufficient. A “business as usual” energy policy risks enormous economic and environmental consequences. In contrast, an energy policy that focuses on producing and using energy as wisely as possible greatly reduces these consequences and positions us to be a strong competitor in the global economy.

However, the electricity and heating fuel challenges are different from the transportation challenges that we face. Therefore, to focus the public debate, this draft of the Energy Master Plan includes only the electricity and heating fuels challenges that we face, and the transportation section of this Plan will be released separately.

With that challenge in mind, I am proud to release this Energy Master Plan as a draft that can focus the public debate on the electricity and heating fuel challenges, and proposed solutions to the many energy related issues we face here in New Jersey.

Sincerely,

A handwritten signature in black ink, appearing to read "Jon Corzine", with a large, stylized initial "J" and a long horizontal stroke extending to the right.

Jon S. Corzine

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EXECUTIVE SUMMARY

Energy plays a vital role in the health of New Jersey's economy and environment. Families who are barely getting by paycheck to paycheck cannot bear ever-increasing energy bills; businesses need affordable and reliable supplies of energy to remain competitive. The production, distribution and use of energy, unless wisely managed, can threaten the economy of this State, the quality of our air and water and the health of our residents.

This draft Energy Master Plan (EMP or Plan) proposes a road map to guide us toward a future with adequate, reliable energy supplies that are both environmentally responsible and competitively priced. Planning for that future must begin with understanding our current energy picture, and understanding what the future will look like if we continue on our current course.

However, this energy picture is very different for the electricity and heating fuels section, compared to the transportation section. The challenges and potential solutions for each of these energy sectors are very different, and warrant separate discussions. Therefore, this draft focuses on the challenges and potential solutions to the electricity and heating fuels sectors, and the transportation section will be released separately.

To develop the energy picture of the future, the State worked with the Center for Energy, Economic, and Environmental Policy (CEEPP) and the Rutgers Economic Advisory Service of the Center for Urban Policy Research (R/ECON™) in the Bloustein School at Rutgers University, to model what our energy circumstances would look like in 2020 (see www.nj.gov/emp). The modeling included a "business as usual" scenario that assumed no major changes in state policies and actions, as well as an "alternative scenario" reflecting changes outlined in this draft Plan. The modeling outlines how "business as usual" and the "alternative scenario" could affect energy use, economic growth, air quality, and greenhouse gas emissions.

"BUSINESS AS USUAL" SCENARIO

The "business as usual" model includes no action by the State other than the policies already in place to address the following energy challenges:

CHALLENGE 1: Growth in the supply of electricity has not been keeping up with the growth in demand.

Our ability to maintain reliable, competitively priced supply is threatened by the fact that we have, over the past decade, consistently and dramatically increased our electricity demands at a time when the resources needed to supply this demand have consistently been reduced. A reliable supply of electricity requires power plants with enough capacity to meet the peak demand for electricity, transmission lines with enough capacity to carry

that electricity from power plants to areas where customers are concentrated, and distribution systems with enough capacity to take the electricity from the transmission system and deliver it to customers. However, demand rises to peak levels for only a small number of hours each year – generally fewer than 50 hours out of 8,760. Building power plants and transmission lines to serve growing peak demand is far more costly than reducing demand during those few hours.

Larger homes, more computers, plasma televisions, and other devices have grown our demand significantly and are likely to continue to fuel higher demand that are not matched by growth in the capacity to satisfy that demand. Between 2002 and 2007, electric generation capacity in New Jersey increased annually at an average rate of 0.71%. Peak demand is expected to keep growing faster than supply has grown. PJM Interconnection, which operates the regional transmission system and administers regional wholesale electricity markets for a 13-state area stretching from New Jersey to Illinois and North Carolina, projected in January 2008 that peak demand in New Jersey will continue to grow from 2008 through 2018 at an annual rate of about 1.75%. This projected growth in peak demand is about 2-1/2 times as fast as supply has grown in recent years.

In addition, regional pressures on our energy supplies exacerbate the gap between supply growth and demand growth. Because of the deregulation of the wholesale markets and creation of a class of merchant generators, competitive pressures entice generation companies to sell their power into the most lucrative markets. For power plants located in New Jersey, the Metropolitan New York markets are attractive because of the higher prices for power that may be obtained there. Therefore, a trend appears to have begun in which new transmission lines are constructed to export needed power from New Jersey into New York. One such project currently exports about 660 megawatts (MW) of electricity from Sayreville to Long Island – equivalent to about 4% of our generation capacity. Additional planned “extension cords” to New York have been proposed which, if constructed, could withdraw more than 2000 MW of additional capacity from New Jersey over the next several years.

Retirements of aging power plants put us even further behind. Less than 40 percent of New Jersey's generation capacity is 20 years old or less, while nearly half is 30 years old or older. Much of that older capacity is expected to retire during the period covered by this draft plan, especially the plants that are less reliable, less efficient, more expensive to run, and with greater greenhouse gas emission rates than newer capacity.

CHALLENGE 2: The price of energy has increased substantially over the past few years, and this trend is expected to continue.

Between 2002 and 2007, the price of natural gas nearly doubled, driving corresponding increases in the price of electricity and heating fuels in New Jersey. That increase is reflected in the price of electricity in the auctions held by New Jersey electric utilities since 2002, to procure a supply of electricity for virtually all of the residential and virtually all but the largest commercial and industrial customers. Between 2002 and

2007, the price resulting from that auction nearly doubled, from 5.06 cents per kilowatt hour in 2002 to 9.94 cents in 2007, and increased further to 11.33 cents in 2008.

For several reasons, New Jersey electricity prices are expected to continue increasing. Most importantly, New Jersey's electric generation fleet has changed over time, to become more reliant on power plants fueled by natural gas, which are more expensive to operate than plants using cheaper fuels. In 1990, power plants fueled by natural gas accounted for about 33% of New Jersey's electric generation capacity; by 2006, that share had grown to about 55%. In contrast, nuclear plants, which generate electricity at a much lower cost for each megawatt-hour, provided 26.6% of capacity in 1990 but only 21% in 2006. In addition, these increases in electricity prices have been compounded more recently by increases in the price of coal.

In addition to the increased reliance on natural gas-based electricity, a recent change in the wholesale electricity markets is fueling further price increases. Electricity suppliers serving retail customers must purchase the right to call on enough generation to meet their customers' peak demand, plus a reserve. The customers bear the cost of purchasing these capacity rights. Now that PJM has implemented a new capacity market structure known as the Reliability Pricing Model (RPM), developed by PJM and approved by the Federal Energy Regulatory Commission (FERC), capacity costs are at least 30 times higher than they were previously. The first four years of RPM will add nearly \$6 billion to New Jersey electric bills, or about 15-20% of each customer's bill. The purpose of this capacity market is to increase generation capacity in regions with increased electricity demand. Most of the RPM revenue has gone to existing power plants, which has resulted in the re-powering of some plants and the reactivation and postponement of retirement for other plants. It has also resulted in new plans for generation investment in New Jersey. However, this has severely diluted any incentive that new plants could receive which would result in significant capacity increases.

Fossil fuels are used not just to generate electricity, but also to heat homes and businesses and to supply manufacturing processes. Our vulnerability to problems in the supply and price of these fuels has been demonstrated again and again. Over the past few years, natural gas prices spiked dramatically after Hurricanes Katrina and Rita disrupted supplies in 2005. Recently, there has been an increase in the use of natural gas for electric generation, which further increases our demand and our vulnerability to price instability.

The price of oil has also been rising, as some of the world's leading oil-producing regions finds them in turmoil. This dependence on these nations to supply our growing energy demands, has added increased concerns about supply, and resulted in enormous increases in the costs for oil and natural gas. The price of oil, which was about \$55 per barrel at the beginning of 2007 and below \$20 per barrel as recently as 2002, exceeded \$110 per barrel this March.

CHALLENGE 3: Without action, our contribution to global warming and other pollutants will continue to increase.

A major part of New Jersey's efforts have focused on the power plants that supply New Jersey's electricity, from within and from outside the state. Those plants account for about a quarter of our greenhouse gas emissions.

Some efforts to preserve the reliability of our electricity supplies threaten to undermine the State's work on global warming. PJM has determined that the reliability of our supply of electricity will be jeopardized over the next several years, unless steps are taken to address the state's electricity demand and supply. Since PJM is responsible for planning and operating the transmission grid reliably, it is in the process of directing upgrades to the grid that will enable New Jersey to import more electricity. Much of these electricity imports would come from coal power production and would result in an increase in our contribution to global warming. In other words, our efforts to cut greenhouse gas emissions within New Jersey's borders will be undermined if the shortage of electricity supply is solved by simply importing more out of state based electricity.

The prospect of increased greenhouse gas emissions is only one reason to avoid increasing our reliance on imports of out of state dirty electricity. Just as importantly, hopes that these imports would bring us greater reliability and lower prices are likely to be dashed. The prospect of federal limits on power plant emissions of greenhouse gases is creating major uncertainty about what coal-based power will cost. In addition, demand for coal is increasing, as coal is becoming more difficult and expensive to mine and transport, and recent history has featured disruptions in coal supply and spikes in coal prices. All of these factors suggest that it would be irresponsible to stake our energy future on increased imports of out of state coal-based electricity.

CHALLENGE 4: The State has much less authority over the supply and price of electricity than it used to.

Until 1999, electric utilities planned, built, owned and operated most of the electric generation capacity in the State, under the oversight of the New Jersey Board of Public Utilities (BPU). State and federal laws changed that, with the goal of opening competitive markets in electricity. As part of this restructuring of the New Jersey electric industry, the electric utilities have divested their generation assets to third parties or to a utility affiliate and the BPU no longer regulates the generation of power.

As a result of these changes, no single entity is empowered to plan the generation, transmission, sale, and use of electricity. PJM, the FERC, generation companies, electric utilities, the financial community, State and federal environmental regulators, and the BPU now share a complex web of often uncertain, conflicting and overlapping decision-making. Along with the diffusion of planning responsibilities and dependence on market forces, we have seen that new generation capacity is not getting built at nearly the pace needed to keep up with growing demand. A spurt of new power plants from the mid-1990s into the early part of this decade has been followed by an almost total absence of new plants, while demand has continued growing unabated. The transmission solutions

which PJM and FERC propose ignore the economic, reliability and environmental concerns which face New Jersey.

The term “Energy Master Plan” stems from State law enacted in the 1970s, when none of these changes were foreseen. The term now seems almost quaint, implying a much more direct ability to plan and implement our energy future than we actually have. This portion of the draft Plan realistically focuses on actions within the State’s control to bring us a future of reliable and competitively priced supplies of electricity and heating fuel consistent with our environmental needs, and actions to influence other decision-makers to do their part in making that vision a reality.

CONSEQUENCES: If nothing is done to address these challenges, the “business as usual” scenario, the State will consume 100,000 GWh of electricity and 590 trillion Btus of natural gas or heating oil. This total energy consumption will cost customers more than \$26 billion per year, which is 60% more than the total annual energy expenditures in 2005. Greenhouse gas emissions would be 14.5% higher than they were in 2005. The economic, reliability, and environmental consequences of the “business as usual” scenario are unacceptable. Actions must be implemented to ensure that New Jersey’s future energy environment provides energy that is competitively priced, reliable and consistent with the 2020 and 2050 greenhouse gas targets.

ALTERNATIVE SCENARIO

Strong, thoughtful actions that help us to use energy more efficiently, to reduce the growth in our need for energy infrastructure, and to produce more clean energy locally can lead us to a better future than what “business as usual” offers, include the following:

GOAL 1: Maximize energy conservation and energy efficiency.

Reducing energy consumption through conservation and energy efficiency is the most cost-effective way to help close the gap between supply and demand, lower energy costs, increase reliability, and lower the state’s contributions to global warming and other air pollutants. Reducing energy consumption at least 20% by 2020, as Governor Corzine has directed, would yield annual electricity savings of 20,000 GWh per year and annual heating savings of 119 trillion BTUs. This reduction in energy consumption will result in significant cost savings, and thereby fuel economic growth in the state. Actions to achieve that reduction include the following:

- Redesign and enhance the State’s current energy efficiency programs in all sectors of the economy to achieve the desired results while remaining cost-effective. This redesign will emphasize a whole building approach to energy efficiency.
- Increase energy efficiency in new buildings with a statewide building code that will make new construction at least 30% more energy efficient than buildings under current code by July 2009.

- Increase energy efficiency in existing buildings through enhanced energy efficiency standards for new appliances and other types of equipment currently not covered by existing standards by 2009.
- Increase awareness about the importance of energy conservation and energy efficiency upgrades by developing an education and outreach program for the public. This will result in a shift in the way the state's consumers think about, and use energy.

GOAL 2: Reduce peak electricity demand.

Supplying electricity during times of peak demand is much more expensive, due to the increased costs of generation and the infrastructure capacity necessary, than electricity supplied during times of non-peak demand. During these times, wholesale electricity prices may increase by anywhere from 100% to 1,000%. While energy efficiency and conservation may help, additional actions need to be taken to encourage people to use less electricity during times of peak demand. Therefore, the following action items are recommended, in addition to the energy efficiency and conservation measures listed above, that would decrease peak demand by 5,700 MW by 2020:

- Expand real-time pricing for commercial and industrial customers with a peak demand of at most 600 kW or greater by 2010 and at most 500 kW or greater by 2012.
- Expand incentives for participation in regional demand response programs.
- Evaluate a strong “inverted tariff” pricing system for residential customers.
- Move the State's electricity grid toward the development of a ‘smart grid’ infrastructure.
- Monitor the results of all demand response initiatives through 2011 and implement the most effective mix of action steps to achieve a total peak demand reduction of 5,700 MW by 2020.

GOAL 3: Meet 22.5% of the State's electricity needs from renewable sources.

Under regulations already in place, such as New Jersey's current Renewable Portfolio Standard, renewable energy sources would generate 16,000 GWh of our electricity by 2020, including nearly 1,500 GWh from solar. This electricity is projected to come from 900 MW of biomass capacity, at least 1000 MW of offshore wind capacity, 200 MW of onshore wind capacity, and 1,500 MW of solar capacity. Since most renewable generation is currently more expensive to build than conventional generation, some financial help is needed to get renewable generation built. The Renewable Portfolio Standard itself provides some help, by increasing the monetary value of renewable power. Other ways to spur renewables include:

- Complete the transition of New Jersey's solar program to a fiscally responsible market that will foster the continued growth of solar energy use.
- Develop New Jersey's wind energy resources, including up to 1000 MW of offshore wind and up to 200 MW of onshore wind by 2020.
- Increase the amount of biofuels and biomass in the State's energy portfolio.
- Increase the Renewable Portfolio Standard for the years 2021 to 2025.

GOAL 4: Develop new low carbon emitting, efficient power plants to help close the gap between the supply and demand of electricity.

We must recognize that we cannot meet our 2020 needs for electricity solely by maximizing renewable energy and energy efficiency. It is projected that by 2020, under business as usual, New Jersey's homes and businesses will use 100,000 GWh of electricity annually. Achieving Governor Corzine's goal for reducing electricity consumption 20% by 2020 would reduce our electricity demand to 80,000 GWh annually. Achieving the installation of 1500 MW of combined heat and power cogeneration facilities by 2020 will provide 10,000 GWh, leaving 70,000 GWh to be supplied. Obtaining 22.5% of our electricity supply from renewable sources, as required by the State's Renewable Portfolio Standard, leaves about 54,000 GWh of demand to be satisfied.

This demand must be satisfied from existing in state power plants, through the development of new in state power plants, the development of power plants outside New Jersey, or from a combination of these options. Whichever option or combinations of options are used to meet this electricity demand, they must be consistent with the State's 2020 and 2050 greenhouse gas targets. Our current fleet of power plants cannot be expected to supply all of this electricity, especially when much of the fleet is aging, expected to retire, or likely to be exporting its power.

Meeting our current and future energy demands will depend on an increase in electric generation capacity available to New Jersey. Importing additional conventional coal-based electricity, or developing more high-emitting power plants within New Jersey, will undermine our efforts to fight global warming. Therefore, New Jersey needs more electric generation capacity that overall is less carbon-intensive. We will:

- Use the State's current authorities to influence the development of that infrastructure, and work with the Legislature to obtain additional authorities that may be needed.
- Foster development of 1500 MW of new cogeneration capacity in New Jersey by 2020.
- Create new electricity generation to meet the State's generation demands that will delay or eliminate forecasted problems with the reliability of the electricity supply, serve the State's greenhouse gas targets, and provide electricity at a reasonable price.

GOAL 5: Invest in innovative clean energy technologies and businesses to stimulate the industry's growth in New Jersey.

The Governor's Economic Growth Strategy committed to aggressively encouraging the expansion and creation of clean energy solutions, and declared the clean energy technology sector as a cornerstone of the Edison Innovation Fund. The State must continue this investment, and expand its efforts to help attract and grow the clean energy technology sector in New Jersey. Therefore, the State will work to implement the following action items:

- Expand the Edison Innovation Fund to invest in innovative clean energy technologies including both energy efficiency and renewable energy manufacturing businesses to stimulate the industry's growth in New Jersey.
- Develop a "Green Collar" jobs program to ensure that sufficient numbers of New Jersey workers have the skills demanded by industry to fill the jobs that are created from the action items in this Energy Master Plan.

Since October 2006, stakeholders have made major efforts to provide the State with information essential to developing this draft Energy Master Plan. We continue to need the help of those stakeholders, and members of the Legislature, to engage in a serious debate about our energy future needed to put this Plan in final form and begin to turn the plans into action. We will hold public hearings, seek written comments, and bring together experts from inside and outside government to put us all in the best position to decide on the wisest course of action.