

Learning From
Experience:

Building an Economically Strong,
Environmentally Responsible
Energy Future



February 2012

Learning From Experience: Building an Economically Strong, Environmentally Responsible Energy Future

“New Jersey is leading the way in showing that clean energy policies are not only good for the environment, but can play an important role in creating jobs and spurring innovation. New Jersey is a pioneer – embracing thoughtful energy policies that move the state forward, while recognizing the inherent tradeoffs involved in energy decisions. We must continue to pursue policies that create a sustainable energy future without creating excessive costs for households or businesses.”

-- Ralph Izzo, PSEG chairman, president and CEO

In 2007, PSEG issued a strategic report outlining a three-pronged approach for New Jersey, our country, and our company to reduce carbon emissions in the energy sector through (1) energy efficiency; (2) renewable energy; and (3) clean central station power (including emissions-free nuclear power and environmentally responsible coal facilities). In the past four years, PSEG has made a combined investment in these areas in excess of \$3 billion.

This paper evaluates our progress and what we have learned to better inform our pursuit of an environmentally sustainable approach to electric usage and generation. This update is especially relevant as our state and nation consider policies to achieve a sustainable energy future and in light of stalled efforts to pass national carbon legislation.

PSEG’s experience serves as a case study of how pursuing environmentally responsible energy policies can create jobs, foster economic development, and reduce emissions that adversely affect human health, while increasing understanding of the costs involved in such efforts. What we have learned can be used to refine our approaches in seeking to maximize the societal benefits of these programs while minimizing costs for customers. In doing so, we recognize the extent to which our efforts have depended on supportive, forward-looking public policies.

Indeed, New Jersey provides a model for the constructive role that public policy can have in spurring clean energy investments to create jobs, stimulate the economy, and promote sustainability. The following pages discuss ways to build upon this model to support a bright future for everyone in the Garden State.

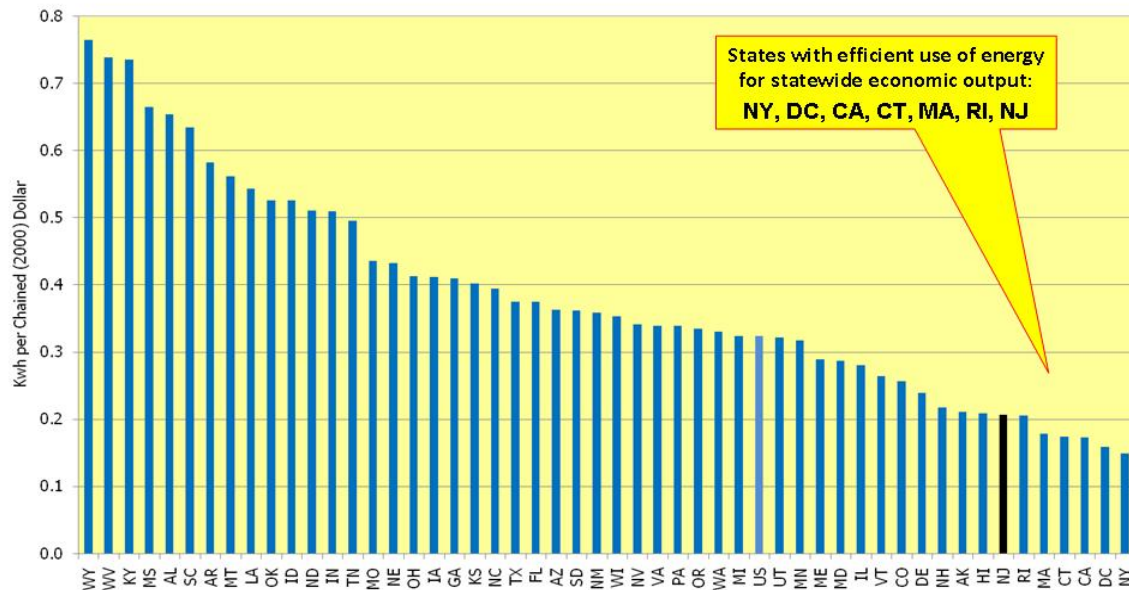
Energy Efficiency

For New Jersey – and our nation as a whole – energy efficiency represents an enormous investment opportunity. In a recent report, McKinsey and Co. estimated that a \$500 billion investment in energy efficiency would produce more than double that amount in savings to the U.S. economy. The power of energy efficiency is increasingly being realized throughout the U.S. A January 2012 study by Institute for Electric Efficiency (IEE) showed that U.S. ratepayer-funded energy efficiency budgets totaled \$6.8 billion – a 25 percent increase over 2010. In addition, the study reported that the programs funded by these budgets saved enough electricity to power nearly 10 million homes and avoids the production of 78 million metric tons of carbon dioxide. It makes sense since energy efficiency benefits customers – large and small – by lowering their bills. Given the current economics of electric markets, over the life of an energy

efficiency project, the cost of saving a kilowatt-hour of electricity is lower than the cost of increasing the supply of electricity by the same amount.

According to research by Sue Tierney, managing principal of the Analysis Group and former state regulator in Massachusetts, New Jersey has become a leader in fostering energy efficiency. As measured by electricity used per gross state product, New Jersey uses energy much more efficiently than many others.

Comparison of States:
Electricity per Dollar of Gross State Product



Tierney’s research further showed that the average consumer’s electric bill actually is lower in New Jersey than in some other states with lower electric rates. This may be because of weather and demographics, as well as makeup of the business sector – a service-based economy is less energy-intensive than a manufacturing-based economy – but it also is, in part, a factor of how efficiently energy is used. And it appears that New Jersey businesses and residents are more productive in their use of energy. Additional investments in energy efficiency can build on New Jersey’s energy use advantage.

From the consumer’s perspective, the equipment and technology to reduce energy consumption are readily available and the paybacks on these investments can be relatively short. From society’s perspective investments in reducing energy consumption are less expensive than building new power plants and avoid the adverse environmental impacts of emissions from generating electricity.

So why aren't more people investing in energy efficiency? The hurdles to such investments vary, ranging from a lack of energy expertise and awareness, limited access to capital or credit, difficulty finding technical assistance or qualified contractors, to skepticism about the payback and competing priorities for investment dollars. In essence, the benefits of energy efficiency are undervalued and misunderstood and obscured by barriers both real and perceived. Public policy and well-designed programs can overcome these hurdles and unleash the potential of energy efficiency for our state.

PSE&G's energy efficiency program for hospitals shows how this can be done.

Hospitals were identified by PSE&G as a high energy-usage sector that faced unique challenges and market barriers that required more than traditional energy efficiency rebates to overcome. Since hospitals are limited in number and easily identified, they offered a unique opportunity to concentrate resources in an innovative program design and to have a strong impact on a targeted sector.

Many New Jersey hospitals are losing money and face a variety of financial challenges, including reduced government funding, costs of treating the uninsured, the need to replace aging equipment, and rising energy costs. Energy audits often identify investments in energy efficiency, where hospitals can achieve a strong return on their investment and short payback periods. But hospital administrators are in the business of health care, not energy management. Their priority is investing in health care so that they will allocate their scarce resources to technology to save lives and remain competitive with other facilities, as opposed to making investments in energy efficiency, which is likely to be viewed as outside of their core business.

The PSE&G Hospital Efficiency Program specifically addresses key barriers to energy-efficient upgrades at hospitals. Ours is one of only four programs in the nation that specifically targets hospitals for energy efficiency improvements and the only program we know of where the utility bears all of the up-front capital costs and enables these large users to repay their share of the costs over time on their utility bill. Requests from hospitals to participate have consistently outstripped the available funding.

PSE&G has invested \$80 million in energy efficiency improvements at 19 hospitals – saving them a total of \$8 million per year in energy cost and \$160 million over 20 years. We conducted energy audits and made various improvements based on a hospital's needs, such as upgraded lighting or building management systems or the replacement of heating or cooling systems, and windows. PSE&G provides an investment-grade audit, assists in developing the bid-ready documents, provides technical assistance, and pays the upfront cost during the construction. On average, the hospital repays one-third of the cost over three years out of its energy savings. Virtually every hospital in PSE&G's service territory wants to participate – and, in 2011, the BPU approved a \$50 million expansion of this effort that will enable us to upgrade 16 more hospitals.

These investments make the facilities more comfortable for their patients and workers, and also infuse hospitals with new, efficient, modern equipment, which has higher functionality, as well as lower energy use. Communities benefit from the investment in these very important local

institutions and from the jobs that are created or preserved in a sector that is a major source of New Jersey employment and is projected to have increased personnel needs in future years.

PSE&G earns a regulated return on these investments just as we do on investments to install a new transformer or replace old gas pipe.

The hospital program is one of 10 PSE&G energy efficiency programs totaling \$344 million that target underserved markets that do not have the expertise or the financial ability to make the investments in energy efficiency. In addition to hospitals, these programs provide urban homeowners and small-business owners, warehouses, supermarkets, multi-family homes, data centers, government entities and non-profits with opportunities to assess the need for energy efficiency improvements and pay for the upgrades.

These programs are helping serve state-identified targeted markets. For instance, at the state's request, PSE&G developed a multi-family program to address energy efficiency in affordable housing, which now has been expanded to the larger multi-family housing market, which represents at least 25 percent of urban housing. These programs provide a roadmap for providing energy efficiency benefits that can be leveraged to overcome barriers and seize opportunities to provide strong support to the remaining manufacturing base in the state and other high intensity energy use segments by offering them the tools, technical support, and capital for energy efficiency projects. And these programs support state policy, favoring financing over rebates. PSE&G has led the way in providing on-bill repayment for all customer types – residential, small business, public and large users.

Our programs have shown that the hurdles to energy efficiency investments in urban areas and in high-energy-use segments can be overcome. By the end of 2011, PSE&G programs had completed 194 projects for municipal government and 575 projects for urban small businesses, audited more than 6,000 residential houses, provided seal-up services to 4,400 and deeper retrofits to 1,600, and provided more than 28,000 programmable thermostats and 400,000 energy-efficient light bulbs for urban residents. In addition, 21 multi-family projects, composed of 155 multi-family buildings containing more than 5,000 individual rental units have moved into the construction and commissioning stages. In total, PSE&G programs are estimated to have achieved electric and gas savings equivalent to 283 million kilowatt-hours of energy annually, roughly the average electric usage of 37,000 PSE&G residential customers.

Energy efficiency programs also create jobs. We estimate that our programs have resulted in more than 750 new jobs. In addition, these investments in energy efficiency can make the state and its businesses more competitive by reducing a major component of costs.

These efforts also reduce the need for new power plants. Last year, PSE&G bid 13.4 megawatts of energy efficiency resources conserved through five of the utility's programs into the PJM forward capacity market auction. The revenues that PSE&G receives will be used to offset the cost of energy efficiency programs to its customers. PSE&G is the first utility in New Jersey to successfully bid energy efficiency resources into the PJM auction. In some circumstances, lower energy usage also can lead to a lower clearing price for electricity – lowering everybody's bills.

There is a cost associated with our programs. We estimate that an average resident with both gas and electric service will pay about 94 cents per month to support our energy efficiency programs.

In the past, energy efficiency was promoted through rebates that disproportionately benefited affluent customers (those most able to afford new, efficient appliances and, thus, take advantage of rebates on these purchases). In contrast, PSE&G's programs are designed for more underserved customers or, in the case of hospitals or municipal buildings, where we maximize societal benefits distributed more widely across the community.

Today, utility energy efficiency programs are part of a comprehensive state energy efficiency portfolio overseen by the BPU that includes utility managed programs as well as programs managed directly by the BPU and other state agencies. The core state programs are designed to address the broad state marketplace and to offer a variety of mainstream program approaches to the widest possible customer base. It is augmented by the segment-focused programs managed by other state agencies and the state's public utilities.

We believe that PSE&G's energy efficiency programs can be an important means of delivering cost-effective energy efficiency, as called for in New Jersey's Energy Master Plan, specifically:

- 1) Increasing the energy efficiency of underserved markets, such as public buildings (schools, administrative buildings, municipal offices) and hospitals. The savings reaped by municipalities through energy efficiency improvements will be welcomed not only by public officials worried about their budgets, but by the residents of communities who will see either additional funds for programs or reduced pressure on taxes.
- 2) Low-income and multi-family residential customers and urban businesses generally do not make energy efficiency investments on their own, despite the strong return on those investments – stronger than they might receive from almost any other investment. We believe that utilities should continue to play a role in spurring these investments – with a special focus on the needs of low-income and multi-family residents who generally pay a large percentage of their income toward energy. Utilities also can partner with local community and non-profit agencies to help educate targeted populations about the advantages of energy efficiency.
- 3) Utilities should continue to be innovators for driving development of new program models and approaches for addressing harder-to-reach customer segments. Utility energy efficiency programs could be leveraged to assist other business sectors that the state would like to make more competitive and that may have capital and financial constraints.

Solar Energy

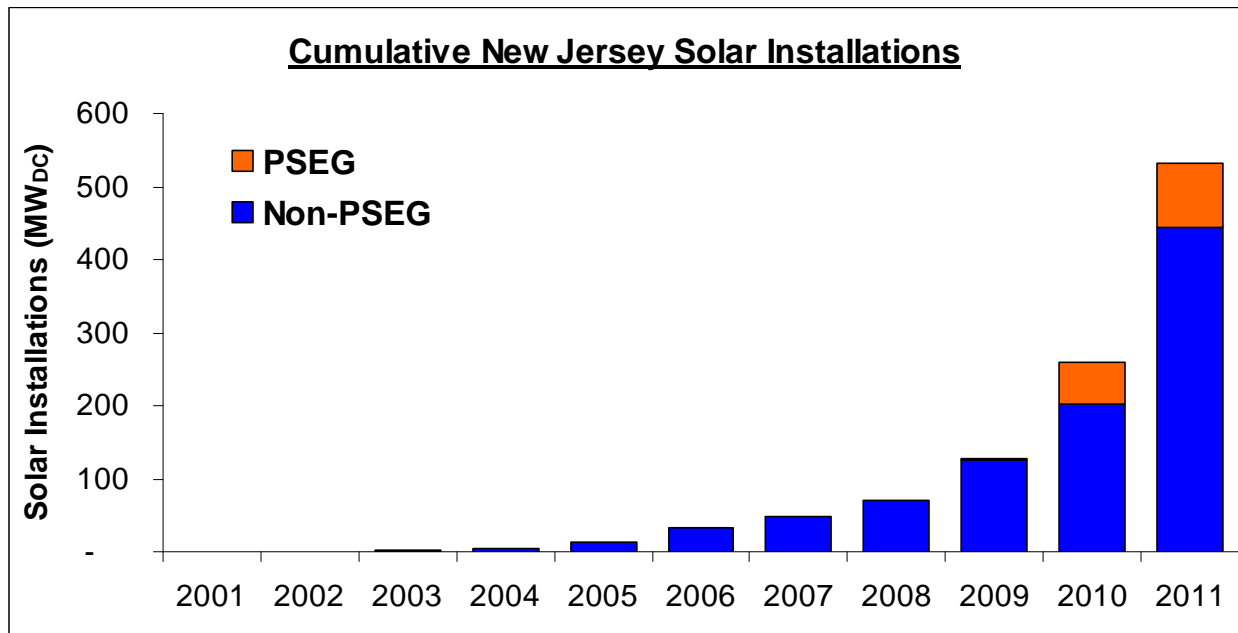
New Jersey ranks second in the number of solar installations in the nation (behind California) and ranks first in the concentration of solar power (installations per square mile). To give a sense of the rapid growth of solar, PSEG unregulated solar business, PSEG Solar Source, unveiled its 2.2 megawatt MARS Solar Garden in 2009. This facility, which provides 20 percent of the energy for the adjacent MARS candy facility, was, at that time, the seventh largest solar facility

in the United States. Less than three years later, it is the 10th largest facility either in service or in construction just in PSEG’s solar portfolio.

However, as long as costs to the environment of other energy generation methods are not adequately recognized, emerging green energy technologies will continue to need some level of subsidy to compete and grow.

In New Jersey, PSEG has been a driver of solar development, providing solar financing, installing the world’s largest pole-attached solar program, and investing in utility-owned solar at our facilities and at customer locations.

PSE&G has provided 11 New Jersey-based companies with \$248 million of work on our solar programs – work that has helped us meet our project goals, while helping them gain valuable experience. Since these were New Jersey firms, this work also helped fuel the local and state economy. In contrast, we spent only \$28.2 million with solar companies based outside of New Jersey – and all of these have a growing New Jersey presence.



Source: New Jersey Office of Clean Energy (OCE) and PSEG

PSE&G Solar Programs

PSE&G’s Solar 4 All program is an 80-megawatt solar initiative equally divided between two segments – centralized installations and pole-attached solar units. As of January 2012, more than 58 megawatts of PSE&G-owned solar power were in service.¹

¹ PSEG Solar Source owns an additional 40 megawatts of solar outside of New Jersey, with 20 megawatts of additional solar under construction in Arizona.

Solar 4 All eventually will provide enough power for approximately 13,000 average-sized New Jersey homes. The program is helping New Jersey reach its solar generation goals, promoting a cleaner environment and spurring economic development by creating good jobs and helping solar businesses take root.

All of the revenue that PSE&G receives from the sale of the solar electricity and capacity, the sale of the solar credits (SRECs), and the federal investment tax credit is returned to ratepayers, offsetting the overall cost of Solar 4 All. In 2011, the program's impact on an average residential customer's bill was about 29 cents per month.

The 40-megawatt centralized portion of Solar 4 All consists of large-scale solar installations on PSE&G property and on customer sites through negotiated lease arrangements. Through these projects, PSE&G is helping to return old industrial sites (brownfields) and closed landfills to productive use. Three solar farms currently are in service on brownfield sites in Trenton, Edison and Linden, with a fourth planned in Hackensack. This past December, PSE&G completed a 3-megawatt solar farm on top of a closed landfill in Kearny.

The "neighborhood" portion of Solar 4 All consists of 40 megawatts of pole-attached solar in the more than 300 towns and cities in PSE&G's electric service territory. Pole-attached solar saves space, while generating highly distributed solar energy. A 40-megawatt solar farm would require about 170 acres of open space, the equivalent of 130 football fields. As of January 2012, more than 120,000 solar units were installed. We are buying the units from PetraSolar, a Plainfield, N.J.-based firm that pioneered the technology. Petra is marketing the units in the U.S. and internationally based on its experience with PSE&G.

PSE&G also has initiated a \$247 million solar loan program to encourage customers in our electric service territory to install solar energy systems on their homes and businesses. These loans help remove the financial hurdle that had prevented many New Jersey businesses and residents from owning solar power. The PSE&G solar loans generally finance up to 50 percent of the total cost of the solar installation. The loans are repaid using solar renewable energy credits (SRECs), which are generated by the solar installation. The PSE&G Solar Loan Program establishes a minimum value for the SRECs over the 10- or 15-year term of the loan, a feature that has gained importance as SREC prices declined in New Jersey toward the end of 2011. The solar loan program allows smaller projects to compete with large projects that can take advantage of economies of scale.

As of January 2012, the Solar Loan Program had closed more than 500 loans worth more than \$110 million that helped finance more than 33 megawatts-dc of solar construction. The program currently has an additional 483 loans in the pipeline that will finance an additional 49 megawatts-dc of solar power.

These solar programs are estimated to have created more than 1,100 jobs. Solar also is helping New Jersey increase its energy supply, reducing the need for additional power plants. New Jersey businesses that have "gone solar" have been able to reduce their electricity bills – and thus make their businesses more competitive.

This last benefit, however, is not shared by all. Those who have built solar systems on their homes and businesses have lowered their electricity bills, while those who have not “gone solar” pay more to fund solar subsidies. The cost of solar energy remains well above the cost of traditional fossil-based electric generation. While the costs of our solar programs represent a small portion of the typical customer’s bill, they are significant in the aggregate and can be especially impactful on large energy users. However, the benefits of our utility solar programs have proven to be large and shared by all customers, and the differential between solar and tradition forms of generation is shrinking as the price of solar has been declining dramatically.

PSEG believes that:

- 1) Additional state support for investment in solar makes sense, although the expansion in these programs should be paced to allow the state to take full advantage of improvements in technology and lower costs that will continue to improve the economics of the industry.
- 2) PSE&G can play a strong role in helping the nascent, but significant, solar sector weather ups and downs in the market and can target our investment where there is the biggest benefit for our customer base and the general public.
- 3) Earlier solar programs relied on rebates, benefiting a small number of more affluent customers. We believe that a segment of solar programs should be designed for programs that maximize societal benefits or where the benefits of solar are, directly or indirectly, more widely distributed. As such, we support using utility investment to install solar panels on public buildings (schools, administrative buildings, municipal offices) or on underutilized public lands (such as landfills or former industrial sites).
- 4) The size of solar projects across the United States is growing rapidly. Given New Jersey’s dense population and high premium put on open space, New Jersey also could benefit from a greater emphasis on rooftop projects.

Wind Energy

New Jersey only has limited pockets of viable onshore wind resources, but New Jersey’s offshore winds are more consistent and stronger. While we had envisioned a major investment in an offshore installation in our 2007 report – and continue to evaluate this type of investment – New Jersey offshore wind remains a work in progress.

Garden State Offshore Energy (GSOE), a partnership between PSEG and Deepwater Wind, was selected by the NJBPU as the state's preferred developer back in 2008 for a 350-megawatt demonstration project. In addition, New Jersey has passed legislation creating a market mechanism for funding wind and offering up to \$100 million in tax credits to manufacturers. The legislation also requires that any offshore wind project that is to receive state incentives show that the benefits to the state would outweigh the costs to the state – dubbed a net benefits test. This may be a high hurdle to overcome. In addition, delays at the federal level (and, to a lesser degree, at the state regulatory level) have slowed development along the East Coast of the U.S. Other challenges facing offshore wind development include uncertainty about federal and state incentives, a lower electric price environment, and the recognition of the rough weather

conditions presented for deep water wind installations. Also, estimates of offshore wind remain expensive – higher than existing technology, such as combined cycle natural gas plants or new nuclear. Significant offshore wind energy remains more of a long-term than short-term option for New Jersey.

While PSEG continues to cautiously explore this investment opportunity, the resolution of several critical permitting, leasing and revenue support mechanisms must be resolved before significant industry activity is expected to begin. PSEG will continue to work with the state to look for ways to reduce financial and regulatory risk of offshore wind, while maximizing the economic benefits to the state. We also will work with the state should opportunities for effective smaller onshore wind projects develop.

Central Station Power – Nuclear

Nuclear power continues to hold several advantages for helping to meet the country's future energy needs. It emits no pollutants, including carbon, and construction of a new nuclear unit in South Jersey would have tremendous economic and job benefits for the region.

Economic conditions, particularly lower electricity prices due to abundant new supplies of natural gas, coupled with regulatory, manufacturing, construction and financial risks, make unlocking these benefits elusive. However, nuclear remains far more cost effective than solar or offshore wind on a per kilowatt basis, with less construction risk than wind, as well. A few new nuclear projects are moving forward in other parts of the country, mainly where there is alignment between a regulated utility and its regulators. PSEG continues to monitor and learn from those efforts.

With access to available transmission, proximity to energy users, and available land, our South Jersey site is one of the best locations for a nuclear unit in the nation. PSEG has taken several steps to ensure that nuclear power will be part of New Jersey's future. First, we recently received license extensions for our Salem and Hope Creek facilities, ensuring that those plants can continue to operate well into the 21st century. We also have submitted an early site permit (ESP) for an additional plant at the Salem/Hope Creek site. When granted, our early site permit will provide a 20-year window for developing another unit. However, without additional risk reduction, it is uncertain whether an additional operating unit will be built in that window.

We welcome conversations with policy makers to explore ways to reduce risks associated with the size and length of the investment required for investment in a new nuclear plant.

Central Station Power – Coal

PSEG has invested \$1.3 billion to retrofit our two New Jersey coal-fired generation stations with state-of-the-art emission controls. These projects created thousands of jobs during construction and resulted in dozens of ongoing new positions. Most importantly, these investments have resulted in reductions of mercury and other pollutants in excess of 90 percent.

Requiring all coal plants in the United States to invest in similar pollution controls will have significant benefits – creating jobs and improving air quality and human health. We strongly support efforts to implement uniform national emissions standards for coal plants and will

continue to be engaged in the national debate on sound environmental regulations that create a level playing field. Regulatory certainty is critical so that those companies making meaningful clean coal investments can have a fair opportunity to recoup their investments.

We recognize that existing technology does not solve the carbon problem and, in fact, pollution controls make carbon worse because it lowers the efficiency of the plant. However, we have faith that American ingenuity can solve this problem as it has solved the problem of sulfur and mercury control.

Central Station Power – Upgrading the State’s Natural Gas Infrastructure

The discovery of new techniques to extract gas from shale and tight sands has greatly increased the known reserves of available natural gas in the United States. This is resulting in lower gas and electricity costs. PSE&G’s gas customers experienced a 35 percent drop in their cost of gas since January 2009.

Lower gas prices should increase the use of natural gas. Commercial, industrial and residential customers who switch from oil to cleaner-burning natural gas also can help to reduce emissions of both greenhouse gases and other pollutants.

However, growth in natural gas usage will be hampered by inadequate capacity for moving natural gas safely around the state. PSE&G will work with state regulators so that we can make the investments to ensure that New Jersey can reap the maximum benefit of this growing energy resource.

Helping the transportation sector do its part

Looking ahead, we stand ready to promote an additional prong to our environmental efforts: moving our transportation sector from its current dependence on foreign oil and gasoline to cleaner natural gas and electricity. A large electric utility such as ours can help foster the emerging electric car market, and our gas utility can assist fleet and heavy truck conversions to natural gas vehicles.

Just as New Jersey has been a leader in solar, PSEG believes that residents and businesses of New Jersey would support initiatives that would make the Garden State a leader in alternate vehicle adoption, as well. We stand ready to work with our regulators to determine how we can best assist the transition of our transportation sector to cleaner sources of energy and help our state take on this leadership role.

Conclusion

Sustainable energy strategies to promote job creation, economic growth, and a healthy environment have never been more needed than they are today. Through investments in energy efficiency, renewable energy, and clean central station power, PSEG is demonstrating that energy companies can help achieve some of society’s most important goals, while fueling long-term growth. New Jersey is reaping substantial benefits as a result of these efforts.

Energy efficiency programs are helping consumers to use energy more wisely and save on their bills. Solar energy initiatives have spurred the growth of a new, clean industry in our state. And

state-of-the-art environmental controls at power plants have created and preserved jobs, while improving air quality and addressing important human health issues.

Of course, clean energy is not cost free. Even energy efficiency efforts, which have proven to pay for themselves over and over again, require upfront investments. Putting lower-cost utility capital to work can be an important way to ensure that clean energy benefits everyone, while keeping costs as low as possible for customers.

There remains a need for strong national clean air regulations that discourage states from competing against each other through lax environmental policies. PSEG will work to help rebuild historic bi-partisan support for sound environmental policies that balance the need for environmental progress with economic needs.

This is not the time to retreat from a sustainable energy course. Rather, there is a pressing need to explore and further develop ways in which New Jersey can continue its progress on the road to being a clean energy leader over the long term. PSEG will continue to embrace the public-private partnerships and relationships that have contributed to New Jersey's well-being and prosperity for more than a century. We remain as strongly committed to New Jersey as ever.