

Electric Vehicles and the 21st Century Electric Grid

SRECs and Electric Vehicles

Solar Renewable Energy Credits and net metering can provide a substantial incentive for the adoption of electric vehicles. At current electricity prices in New Jersey, electricity costs more than gasoline for equivalent energy supply to the vehicle. Solar energy under current policy is an attractive alternative, reducing the cost per kWh to zero at the price of additional investment to install the solar system, which pays out in relatively short order due primarily to the value of SRECs. The solar system provides cheap power and an inverter which can be valuable in fostering Vehicle-to-Grid (V2G) integration and the vehicle provides an increase in electric demand which can justify a larger solar system and additional revenue from SRECs.

This latter advantage can only be realized to finance the vehicle and the solar installation if the prospective increase in power consumption due to the vehicle can be added to the historic or projected power consumption of the residence in setting the maximum permitted size of the solar installation. Typically a vehicle will use 500 kWh per month for recharging, although since there are very few vehicles, no one can document their use by historical records, as currently required for solar installation permitting.

AN INEXPENSIVE MEANS OF FOSTERING RENEWABLE ENERGY AND ITS APPLICATION TO THE TRANSPORTATION SECTOR IS THEREFORE TO PERMIT SOLAR INSTALLATIONS OF ADEQUATE SIZE TO SUPPLY BOTH A RESIDENCE AND THE VEHICLE(S) CHARGED FROM IT BASED ON PROSPECTIVE USE OF THE VEHICLE RATHER THAN ACTUAL EXPERIENCE.

V2G and the Smart Grid

Communication technology and electric storage battery technology have now advanced to the point at which it is possible to expect a massive conversion of automotive transport to electric energy from petroleum. The advent of the lithium-ion battery has provided an almost ideal power source for both pure electric vehicles and plug-in hybrids. The problem is cost, and the solution is closer integration of the vehicles with the grid made possible by modern communication, either Wi Fi or over the power lines themselves.

The availability of a large number of 20 kWh batteries distributed in vehicles charging at residences and places of business provides the capacity to provide ancillary services to PJM in frequency regulation, spinning reserve and demand management for which they are already set up to pay by auction. The communications revolution provides the data highway enabling the individual vehicle batteries to be aggregated into megawatts of capacity that PJM can use.

The potential of V2G to generate revenue by providing useful services can be expanded by controlling charging times to absorb off-peak power and avoid on-peak charging to

reduce or eliminate the need for additional distribution capacity. The availability of a massive source of power during the day can be used to offset peak consumption, particularly if combined with solar installations which produce at their maximum rate during the summer peak when it is most needed. With modern communications this resource can be mobilized locally to optimize the response to peaks and emergencies and maximize efficient use of the existing grid.

The technology to perform all of these functions exists, but it needs to be implemented which requires receptivity by regulators (state and local), customers, aggregators, PJM, and vendors. V2G represents a massive opportunity to create value, but the value accrues to a number of stake holders, none of whom have sufficient incentive or impact to make it succeed on their own.

NEW JERSEY COULD BE A LEADER IN THE INTRODUCTION OF A TRULY ADVANCED ELECTRIC GRID, AS WE HAVE BEEN IN THE RELATED FIELD OF SOLAR RENEWABLES, BY FOSTERING THE IMPLEMENTATION OF SMART GRID TECHNOLOGY TO UTILIZE AND INCENTIVIZE THE CREATION OF MASS ELECTRIC STORAGE VIA DISTRIBUTED ELECTRIC VEHICLE BATTERIES.

September 22, 2010

New Jersey Board of Public Utilities
Office of Policy and Planning
Two Gateway Center
Newark, New Jersey 07102
EMPadmin@njcleanenergy.com

Re: EMP Comments

Dear President Solomon:

My name is Dr. Shihab Kuran, and I am President and Chief Executive Officer of Petra Solar. Petra Solar Inc. is the New Jersey-based worldwide pioneer and market leader in grid-tied, pole-mounted, distributed smart solar generation systems for utilities. Founded in 2006 and headquartered in South Plainfield, New Jersey, Petra Solar's success is the culmination of more than 16 years of research and development, and has grown from 15 employees last year to 150 employees in 2010. Petra Solar thrives thanks to the Garden State's progressive clean energy laws and its national leadership in the use of Solar Renewable Energy Credits, (SREC).

I would like to outline the economic and environmental benefits of solar power, the uniqueness of Petra Solar to New Jersey, and stress the importance of maintaining New Jersey's progressive solar energy environment in the updated Energy Master Plan. Solar power is good for business, good for the environment, good for sustainable economic growth, and good for New Jersey.

Solar power is good for New Jersey's economy. In the current economic climate, efforts to reduce energy costs and create jobs are more important than ever. Investment in solar energy does both. Amid our prolonged economic downturn, investing in alternative energy is one way in which we can take steps to create jobs and jump-start our economy. Solar power is becoming more cost-effective with each passing year. The price of solar panels is declining fast -- prices are down 50 percent from just a few years ago, thanks to technology improvements and an increasing number of manufacturers entering the solar market. Continued investment is of the utmost importance in allowing the technology to continue to advance.

It is sometimes argued that solar power is not cost effective when compared to other types of energy. Such statements do not adequately take into account a number of important considerations:

- 1) There are significant negative externalities imposed on our environment, society and health by the extraction, distribution and use of fossil fuels. The actual costs for fossil fuels are much higher than what consumers actually pay, which has long term consequences on our health and economyⁱ.
- 2) Renewables may have higher up-front costs but their operating costs are low because they avoid fuel costs. This is particularly important in a future where fuel costs are subject to significant volatility due to population growth, and catastrophic events (BP oil spillⁱⁱ, terrorist attacks).
- 3) Solar power installations or plants compete against "peaking" plants. In other words, since air conditioners and other loads place the heaviest demand on the grid during mid afternoon sunshine hours -- solar power competes directly against natural gas plants that only get turned on to meet that peak demand. When solar costs are compared to other peaking electricity costs, in many cases solar comes out as the cheaper alternative;
- 4) The distributed nature of solar power installations offers major advantages that have not been fully monetized. These include redundancy and possible back up power in case of outages, reduction in transmission and distribution losses, and enhanced security against any threats to the generation and distribution networks.

Solar power helps meet our electricity needs. Solar tends to generate the most electricity during times of peak demand, when the electric grid is under the most stress -- usually in mid-afternoon, and on hot, sunny days. Furthermore, solar power is free and abundant energy -- the amount of solar energy absorbed by the earth's atmosphere in one hour is more than the total amount of energy the entire world consumes in a whole year.

Solar power is a renewable, non-polluting, safe, and free source of energy. The record temperatures that we have experienced in New Jersey this summer and the nor-easters we experienced last spring have given us a glimpse of what we can expect in the future, which will include more record heat, severe rains, heavy snowfalls, rising

tides, and damaging floods, according to a new report co-authored with Environment New Jersey and the Rutgers Institute of Marine and Coastal Science. There is no question that our climate is changing at least in part because of greenhouse gas emissions. Solar panels generate zero carbon dioxide emissions, thus making no contribution to global climate change or air pollution, and they pose no risks of spills, meltdowns, or other catastrophic disasters.

Solar power is an important hedge against future fuel prices. Energy costs are volatile due to their dependency upon fuel prices that are subject to substantial fluctuations. Fuel pricing will likely increase significantly in the future due to population growth, increased per capita usage, and increased globalization that drives energy needs for a growing percentage of the world's population. In addition, a number of policy efforts are attempting to put a price on carbon generation in the United States. Such a structure would significantly increase the baseline price of natural gas and coal generation, and would further warrant the deployment of carbon neutral generation sources including solar

Renewable subsidies are far less than those of traditional fossil fuels. It is a myth that renewables are the only form of energy that is subsidized. A study released by the Environmental Law Institute, a non-partisan research and policy organization, notes that subsidies to fossil fuels totaled approximately \$72B over seven years in contrast to renewable subsidies which amounted to \$29B over the same period. And of that \$29B only \$12.2B was for traditional renewable (solar, wind) while the remaining \$16.8B was for corn ethanol.ⁱⁱⁱ

Solar power will be even more valuable when dynamic pricing is implemented. There is no doubt that we as a state will join the world in adopting dynamic pricing as a means of modifying patterns of energy consumption and controlling the cost of energy. In a dynamic pricing structure more costly energy consumed during peak demand hours is more expensive than energy consumed during off peak hours. Distributed solar generation will become even more attractive when retail prices reflect grid constraints and peak demand. Today's system is suboptimal because the differential in cost is being absorbed by the rate payers. Dynamic pricing will drive users to align their consumption with grid constraints, and solar power will be more of a precious resource in helping with peak shaving.

Solar leverages innovation. The price of solar has dramatically decreased in the past decade due to advances in technologies, manufacturing, systems, labor and processes. Solar has proven that it can benefit from significant advances in technology and will continue to do so for a considerable time. At Petra Solar we are pioneering a truly innovative approach. It's what we call our SunWave™ system and it's designed to be installed right on existing utility poles and connected directly to the grid secondary. This solves a number of challenges associated with solar:

- Permitting and siting – Our SunWave™ system avoids permitting and siting, which are major impediments to the development of renewable and fossil fuel projects.
- Transmission line availability and costs – SunWave™ connects directly to the distribution grid, avoiding transmission costs and the need to upgrade the grid.
- Operations and maintenance - The SunWave™ is based on a per-system distributed architecture. This means no system interferes with the operation of another, limiting the severity of any single outage. The systems communicate their status and health back to a network operations center that the utility administers. Furthermore, our systems monitor the distribution grid itself, providing valuable information about the utility's distribution network which could further reduce operational expenditures beyond the solar asset itself.

This innovative system has resulted in the largest photovoltaic (PV) project under construction in the U.S. today. This real-world 40MW program demonstrates a proven, low-risk solution to deploying renewables that is proving to be one of the most cost-effective solutions for rate payers. Our system has received significant interest from other regions of the United States and the world as a model to replicate^{iv}.

Petra Solar is poised to help New Jersey's economy grow and environment improve. Petra Solar brings both money and jobs to New Jersey. We have raised \$54 million from out-of-state sources and millions more from the USDOE, the NJEDA, and others. Much of this money is cycled into New Jersey's economy by providing "green jobs" to state residents. Research has shown that there is over a 6x multiplier in a state's economy on the purchase of local energy technology^v.

Petra Solar is also helping to raise New Jersey's profile as a leader in energy innovations. More than just a solar panel company, Petra Solar is a solar and "smart

grid" company. Smart grid is a term that refers to upgrades to the electric power grid that use advanced communication technologies, grid sensors, information processing systems, and actuators to produce an "intelligent" system that enables more efficient and reliable grid operation. In combination, solar and smart grid provide a benefit greater than the sum of the parts. Distributed energy generation closely coupled with management and control capabilities provide for robust infrastructure and unique fiscal opportunity: the solar smart grid.

About Petra Solar

Petra Solar has developed and patented an entirely new approach to solar power generation. Its technology-based products are being leveraged right now to create innovative solar, smart grid, and grid enhancement solutions. This is unique in the solar industry and I believe it holds the promise of becoming common throughout the world.

Sun Wave™ systems generate and provide power directly to the grid. But they do more than that. They also contain smart grid features that provide real-time information back to the utility about critical operating parameters across the electrical grid and about usage by customers. This unique information enables the utility to increase operational efficiency resulting in significant cost reduction.

Earlier this month Sandia National Laboratories awarded Petra Solar its prestigious Solar Energy Grid Integration Systems (SEGIS) contract as part of the U.S. Department of Energy Solar Energy Technologies Program. We received this contract because of the advances we have already pioneered. Petra Solar's innovative technology and approach have successfully addressed long-standing issues connected with adding solar electricity to the mix of energy sources utilities use to generate, transmit and distribute electricity to the public.

As U.S. Energy Secretary Steven Chu explained when announcing the award, a project like this helps ensure that efforts to advance renewable energy and support the modernization of the electrical grid are coordinated and integrated, helping to provide reliable, clean energy at lower costs.

The need to encourage greater innovation through renewable energy R&D investment could not be clearer, not just to develop alternative sources of energy, but also to create

jobs. Innovation puts people to work. Using my own company as an example, we've grown from 15 employees at the beginning of 2009 to about 150 today - a tenfold increase. By the end of the year, we expect to grow to at least 165 employees. And that investment has a multiplier effect beyond our company.

I would like to note that earlier this year, we were proud to host Governor Christie and Lieutenant Governor Guadagno at our South Plainfield headquarters. During the visit, the Governor congratulated Petra Solar employees for their hard work and for being part of what he called an extraordinary New Jersey success story. The Governor called solar energy the "next frontier," saying it will help spur economic growth. He identified Petra Solar as an example of his goal to jolt life into the state's economy by attracting and retaining successful businesses in New Jersey.

We are very proud to call New Jersey home and thank the Board of Public Utilities for its commitment to renewable energy.

ⁱ The real price of gasoline for example is anywhere from \$8-\$15.

<http://www.iags.org/n1030034.htm>
[http://www.glgroup.com/News/Grid-Parity-and-the-Cost-of-Solar-\(PV\)-Electricity-at-Exelons-Pullman-Plant-49678.html](http://www.glgroup.com/News/Grid-Parity-and-the-Cost-of-Solar-(PV)-Electricity-at-Exelons-Pullman-Plant-49678.html)
<http://www.washingtonpost.com/wp-dyn/content/article/2010/06/12/AR2010061200167.html>

ⁱⁱ *Wall Street Journal* reports, the oil spill's impact on prices can't be seen in the current spot price but [is noticeable in crude oil futures contracts for oil delivery in the years to come](http://online.wsj.com/article/SB10001424052748704515704575282871418108164.html?mod=WSJ_latestheadlines). Since April 20, the price difference between a July 2010 crude oil contract and a July 2015 crude oil contract—that is, the premium that oil traders are willing to pay for the contract further in the future—has nearly doubled from \$7.68 a barrel to \$15.05 a barrel. The rising premium means that the spill convinced investors that oil prices would rise more sharply in the next five years than they previously thought.
http://online.wsj.com/article/SB10001424052748704515704575282871418108164.html?mod=WSJ_latestheadlines

ⁱⁱⁱ http://www.eli.org/pdf/Energy_Subsidies_Black_Not_Green.pdf

^{iv} “New Jersey could serve as solar energy model for SF

Read more at the San Francisco

Examiner: <http://www.sfexaminer.com/opinion/blogs/under-the-dome/New-Jersey-could-serve-as-solar-energy-model-for-SF-103076944.html#ixzz106yzmx6I>”

<http://www.sfexaminer.com/opinion/blogs/under-the-dome/New-Jersey-could-serve-as-solar-energy-model-for-SF-103076944.html>

^v Pereira, A.M.. —Is all public capital created equal?|| *Review of Economics and*

Statistics, 82:3 (2000): 513–518.

**COMMENTS OF PUBLIC SERVICE ELECTRIC AND GAS COMPANY,
PSEG POWER LLC AND PSEG ENERGY RESOURCES & TRADE LLC ON
ENERGY MASTER PLAN**

September 30, 2010

I. Introduction

PSEG appreciates the opportunity to take part in the development of the Energy Master Plan. We have participated in all of the public roundtable discussions held in August and September. This process has afforded an opportunity for a full and open discussion by many interested stakeholders of diverse viewpoints. As the process of developing the Energy Master Plan moves forward, PSEG is committed to continued participation.

The State of New Jersey currently faces serious economic and environmental challenges. While PSEG recognizes there is no panacea to address these problems, the Energy Master Plan can help the State of New Jersey improve environmental quality, create jobs and lower energy costs. Moreover, by acting decisively now, New Jersey will be better able to achieve its strategic objectives and to advance its preferred policy initiatives.

PSEG respectfully submits that the following four key elements need to be included in the Energy Master Plan in order to effectively address the energy-related challenges that now face the State:

- **Maintaining Reliability and Supply Adequacy at a Fair Price** - Maintain generation adequacy consistent with reliability standards and provide service to provider of last resort customers through cost effective market mechanisms and reliability enhancements to the transmission system. PJM's Reliability Pricing Model ("RPM") and energy markets and the Basic Generation Service ("BGS") auction developed by the BPU are providing service in a reliable and economic manner to New Jersey customers. Care must be taken that the policy initiatives pursued by the State do not undermine these foundational elements of the energy supply and reliability paradigm.
- **Energy Efficiency** - The aggressive deployment of cost-effective energy efficiency and demand response technologies and standards.
- **Renewable Technologies** - The development of renewable generation and fuels to improve the emission footprint of New Jersey in a cost-effective manner that will support the growth of green sustainable jobs in New Jersey.
- **Clean Central Station Power** - The development of low- or no-carbon central station power. At the present time we believe nuclear power is the most effective carbon-free central station power source available.

The following comments and suggestions are offered in the spirit of cooperation, so that the Energy Master Plan can become a comprehensive road map to New Jersey's energy future and can gain broader support from constituents.

II. Maintaining Reliability and Supply Adequacy at a Fair Price

The Energy Master Plan should recognize that the State's core mission in the area of energy policy should be to maintain reliability and supply adequacy within its borders at prices that are fair to consumers. In this regard, PSEG believes that the State has been on the right track in utilizing the Basic Generation Service auction and in relying upon the wholesale markets administered by PJM. In addition, the State has acted properly in supporting reliability based transmission projects. The Energy Master Plan should continue to support these policy choices.

A. Basic Generation Service

The Electric Discount and Energy Competition Act of 1999, N.J.S.A. §§ 48:3-49 *et seq.* ("EDECA") initiated the transition from a regulated to a competitive retail power market in New Jersey. In conformance with the requirements of EDECA to create a mechanism to procure BGS for consumers that do not choose third party suppliers, the BPU has approved statewide auctions for the procurement of full requirements services in each of the last nine years.

The BPU approved auction design allows potential suppliers to bid for the right to supply two types of products: first, for BGS-Commercial Industrial Energy Pricing ("BGS-CIEP"), a variable hourly-priced product for industrial and larger commercial customers supported by one-year supply contracts, and, second, BGS-Fixed Energy Pricing ("BGS-FP"), a seasonally fixed-price product for small commercial and residential customers supported by "laddered" three year supply contracts. The BPU auction utilizes a "descending clock" design in which all participants bid on the identical "load following" product supplied under a standard form contract. The BGS supply is a fully delivered and full requirements product that addresses all of the complexities of the energy industry and simply provides electricity to customers when and in the quantities that customers choose. In the BGS auction, accordingly, the only variable considered in selecting winners from the eligible bidders is the price offered.

Economic evaluations of the BGS process have concluded that its design provides a very efficient methodology for procuring electric power at the lowest cost consistent with prevailing market conditions. Also, as the BPU has previously noted, the BGS process allows New Jersey consumers to have access to supply from the PJM wholesale energy markets which are among the largest and most efficient in the world. Accordingly, this gives New Jersey customers the benefits of the most competitive prices from suppliers throughout the entire PJM region.

At the same time, the BGS pricing mechanism has provided price stability. The three-year rolling procurement structure of BGS supply for residential and smaller commercial and industrial customers insulates these customers from the price shocks resulting from short-term energy price volatility. For example, in the aftermath of Hurricanes Katrina and Rita, retail electric prices in other nearby states rose over 50 percent, while BGS prices in New Jersey rose only 13 percent. Conversely, when prices are moderating, the BGS design allows customers to switch to third party supplies thus providing an option

for circumstances in which the BGS price is higher than the current market price. The value of this option is shown by the significant migration to third-party energy supply which has occurred with respect to the residential and small commercial class of customers, and the recent entry of several energy marketers that are targeting New Jersey's residential customers. The Board should monitor this current increase in switching activity as to the impact on the integrity of the BGS auction process and the potential risks imposed on the remaining BGS customers from this migration.

Potential alternatives to the BGS auction approach such as procurements utilizing long term contracts would be poor policy choices. Even assuming that a particular long-term contract looked attractive when entered into, it could result in high out-of-market rates at a remote future date. The adverse impacts on customers moreover, would likely fall disproportionately on those least able to bear them. If the BGS procurement mechanism results in a supply portfolio that includes significant quantities of long-term, above market contracts, customer switching can be expected to increase. In turn, this will further reduce the size of the BGS customer class thus increasing the adverse rate impact of any high cost long-term contracts. Ultimately, those customers that are poor credit risks or for some other reason are unable to switch could end up bearing the brunt of any stranded cost amounts.

There are many industry examples of efforts by government entities to engage in such long-term unit specific procurement. While these efforts were well-intentioned the results have often been harmful to customers:

- Long term contracts under the Public Utility Regulatory Policies Act of 1978 (PURPA) that utilities were forced to enter into under the direction in the 1980s and 1990s ended up being well above market in most cases thereby resulting in out-of-market costs that are still being paid by consumers to this day. PSE&G's PURPA contracts would have resulted in about \$2.026 billion in above market payments over the period 1995 to 2009 had the largest of those contracts not been reformed by PSE&G. Restructuring resulted in \$935 million in savings over that time – still resulting in net overpayments of about \$1.1 billion in above-market amounts actually paid by consumers.
- Contracts entered into by the California Department of Water Resources in the Spring of 2001 to stabilize prices during an energy crisis were severely out of market only a few months later resulting in a Complaint filing at the Federal Energy Regulatory Commission in February 2002. The filing alleged that the above market portion of 44 mostly long-term transactions equaled about \$18.7 billion.¹ These above market costs were in large measure borne by consumers.

The current BGS auction structure with its three year “laddered” contract approach has proved to be a very effective mechanism for obtaining supplies needed to meet default

¹ See *Public Utility Commission of California v. Allegheny Energy et al*, FERC Docket No EL02-60-000, February 25, 2002 Complaint, p. 29.

services requirements at reasonable prices generally reflective of market conditions. Further, the capability to switch to third party supplies provides a safety valve available to many New Jersey consumers if BGS prices are perceived to be unacceptable.

B. The Value of PJM Markets

New Jersey currently benefits very significantly from being part of a large energy market and control area. The PJM energy and capacity markets, in conjunction with the BGS procurement auction, are resulting in demand being met in a reliable and economically rational manner. Since RPM began in 2007, the total net increase in installed capacity has been 17,887.3 MW. This incrementally new capacity has included new generation capacity resources, capacity upgrades to existing generation capacity resources, plant retirements and deratings, as well as new demand resources, upgrades to existing demand resources and new energy efficiency resources,²

The increase in demand response and energy efficiency resources has been especially dramatic both in PJM generally and in New Jersey in particular. For example, the total quantity of demand resources offered into the 2013/2014 Base Residual Auction (BRA) held for RPM was 12,952.7 MW which represents an increase of 3,105.1 MW (32%) over the demand resources that offered into the 2012/2013 BRA.³ In New Jersey specifically, the quantity of demand resources increased from 916.5 MW for 2012/2013 BRA to 1,557.4 MW for the 2013/2014 BRA, an increase of 640.9 MW (70%).⁴

Critics of RPM often claim that RPM prices are “too high.” As support, they point to RPM prices in other regions of PJM such as western Pennsylvania in the “rest of RTO” region where prices have cleared at lower levels.

These criticisms of RPM, however, are unfounded. As designed, when supply and demand are in equilibrium such that new generation is being built to meet growing consumption, prices in RPM auctions should tend to clear near the “cost of new entry” – the value representing the capital costs to construct a new combustion turbine plant net of expected energy revenues, amortized over 20 years. This is, in fact, what has been occurring in New Jersey which has seen two auctions clear based on offerings of new entry resources at price levels slightly below the cost of new entry. Clearing levels in other auctions covering New Jersey in which only existing resources were procured have been somewhat lower but these outcomes are also consistent with the expected operation of RPM. In those cases, developers refurbished older units or increased capacity of existing units – an economically rational response of pursuing lower cost alternatives before the higher cost option of building new plants. In addition, significant quantities of demand side resources have entered the market thus offsetting the need for new generating plants.

² See , 2013/2014 RPM Base Residual Auction Results, p. 14
<http://www.pjm.com/markets-and-operations/rpm/~//media/markets-ops/rpm/rpm-auction-info/2013-2014-base-residual-auction-report.ashx>.

³ *Id.*, p. 1.

⁴ *Id.*, p. 5.

Thus, while prices in some other parts of PJM have generally been lower, the claim that RPM is not working properly in Eastern PJM is incorrect. To date, RPM has worked very well in meeting capacity adequacy requirements for New Jersey and is pricing the value of those capacity resources in a manner fully consistent with its design. Further, over longer periods, capacity prices throughout PJM should tend to converge as excess capacity in the lower priced regions is retired and as demand increases.

This is not to say, however, that RPM could not be improved. For example, one area ripe for reform is the manner in which RPM is coordinated with the PJM Regional Transmission Expansion Planning Process (“RTEP”). Because transmission planning in PJM is largely focused on a five year horizon and RPM auctions cover a period about three and one-half years into the future, there is a pronounced disconnect in coordination. Since transmission planning is more forward-looking, the announced in-service dates for transmission upgrades often have undue influence on RPM auction outcomes. This may occur either because the capacity transport levels associated with a particular transmission project obviate the reliability need for capacity resources in an otherwise constrained area or because of the general perception created by transmission announcements that existing capacity price differentials will be eliminated.

Improving the coordination between transmission planning and the forward procurement period used in the RPM auction would send more transparent price signals to generators thus facilitating the construction of new capacity resources when and where needed. Conversely, the “preference” currently given to transmission because of the lack of consistency between the forward periods covered by RPM and RTEP can be expected to result in sub-optimal outcomes that may ultimately prove to be more expensive for consumers. Better coordination would occur if the forward procurement period for RPM were increased to five years and thus were consistent with the primary horizon used for transmission planning in RTEP.

C. Reliability Based Transmission

Transmission planning is also an indispensable component of a comprehensive program for assuring reliable service to customers. The State should continue to support reliability based transmission projects, such as the Susquehanna-Roseland 500 kV transmission line, when such projects are shown to be needed. As discussed above, however, the planning process should not be biased towards transmission solutions. Generation, energy efficiency and demand response will often be the most cost effective way to meet system reliability needs. Reforms to better align RTEP and RPM thus should be pursued.

III. Energy Efficiency and Conservation

Achieving much higher levels of energy efficiency must be recognized as a fundamental goal of the Energy Master Plan. Energy efficiency not only saves energy and dollars but also reduces environmental impacts. Adopting policies and mechanisms that will provide the incentives and framework for pursuing opportunities for energy efficiency and conservation should be included as a central Energy Master Plan feature.

To date, PSE&G has achieved notable successes in connection with energy efficiency and conservation. Since December 2008, the BPU has given PSE&G approval to invest approximately \$300 million in energy efficiency and demand response programs, thereby expanding access to efficiency measures for lower income residential customers, multi-family affordable housing units, small businesses, municipal buildings and other cash-strapped businesses such as hospitals. For example, PSE&G specially designed a program for the hospital sector that provides both incentives and financing. This program has been extremely successful and, in fact, has been oversubscribed. The program investment budget is \$79 million and we have at least that much activity in the queue, 24 more projects representing another \$80 million. This program investment alone will create over 300 jobs as projects proceed through the construction phases. Overall, it is estimated that PSE&G's investment in energy efficiency will put approximately 900 people to work. To date, completed projects and those under construction are expected to save 116,000 MWhrs of electricity and 3.8 million therms of natural gas per year resulting in 110 fewer tons of CO₂ released into the atmosphere each year.

Unfortunately, New Jersey residents and businesses are not investing in efficiency at anywhere near the rate necessary to meet the goal of retrofitting all 3.7 million New Jersey's buildings – more than 300,000 buildings per year through 2020. Although it has been shown time and time again that savings associated with energy-efficiency improvements exceed the costs, most consumers are not well-positioned to identify and undertake economically sensible conservation decisions. Because pay-back comes at a remote future date well after when the expenditure is made, most consumers – including many small businesses – either do not perceive the value of the investment or are unable to raise the necessary capital needed to fund the projects. For many large businesses, the barrier is usually competition for capital and the longer payback for efficiency resources. For example, a large business customer indicated to PSE&G staff that they cannot justify an efficiency option with a payback in excess of four years without additional incentives.

Utilities are well equipped to perform the role that consumers are failing to perform by promoting energy efficiency and developing energy efficiency projects:

- Utilities have extensive experience in providing energy and constructing facilities – in the case of PSE&G, more than a century of experience;
- Utilities have a highly skilled and dedicated workforce living in the same communities that they serve;
- Utilities have a long track record in deploying capital to achieve social benefits; and
- Utilities have the knowledge and ability to educate the public concerning climate change and how to save energy.

Further, the vast majority of residents and businesses in the State are served by electric and/or gas public utilities. These companies are ideally positioned to promote energy efficiency, house by house, neighborhood by neighborhood. This includes opportunities to bring energy efficiency not only to affluent households but also to urban residents, low-income customers and renters – “universal access” to all customer classes. Utilities are uniquely positioned to increase penetration across all customer segments by making

investments that can be amortized over time as opposed to being expensed in the year the measures are installed.

The Energy Master Plan should therefore include policies to further promote utility involvement in energy conservation and efficiency programs such as those under undertaken by PSE&G to date and which have enjoyed so much success. In particular, the Energy Master Plan should expressly recognize the need for regulatory mechanisms that allow utilities to invest in energy efficiency and to earn a fair return on those investments. By employing this approach, the State can best provide the sources of capital and the incentives to aggressively pursue energy efficiency and conservation measures. In addition, the Energy Master Plan should recognize the unique role that utilities can fulfill by deploying energy efficiency projects across all customer classes, geographic areas and economic strata.

IV. Renewables

The development of renewables within the State should also be a central tenet of the Energy Master Plan. Like energy efficiency measures, utility involvement will be needed for the State to be successful in this area. There have already been notable achievements for solar generation and the opportunity to deploy even more solar generation is presented. In addition, given its coast line on the Atlantic Ocean, New Jersey has ample opportunities to develop off-shore wind projects.

Solar and wind power have tremendous environmental benefits, but are substantially more expensive today than traditional energy sources. Fortunately, utilities can promote the expanded use of renewables in ways that help lower the cost impact.

Further, the State should also recognize that delay in pursuing its goals for the development of in-state renewables could result in the loss or at least the diminution of its ability to ever achieve them. Federal policies currently favor the development of renewable projects – especially wind – in regions remote to our State. Unless New Jersey acts quickly and decisively, the potential benefits of becoming a hub for renewable projects will instead be realized in other jurisdictions.

A. Solar Power

PSE&G's solar loan and "Solar 4 All" programs provide examples of how utilities can successfully implement programs for the deployment of such resources in a cost-effective manner. These programs should be used as the blueprint for future programs in this area.

Based on the approvals provided by the BPU, PSE&G is investing more than \$700 million into a range of solar energy initiatives. This includes more than \$500 million in 80 megawatts of grid-connected solar projects – an effort we have labeled Solar 4 All because it provides a way to bring green energy to all our customers. This initiative represents an attempt match up those paying for electric services – PSE&G ratepayers – with those benefiting from the programs. We are doing this in a variety of ways: putting solar units on 200,000 poles and streetlights, and putting up solar panel arrays on utility property and on schools, non-profits and municipal facilities.

PSE&G's initial solar loan program was launched in April 2008 to help finance the installation of 30 MW of solar panels on homes, businesses and municipal buildings. The program provides stable, secure capital to business and residential customers. In March 2009, PSE&G was given approval to expand the successful solar loan program to help finance the installation of an additional 51 MW of solar panels. The program will be available for two years and applications will be accepted on a first-come, first-served basis until 51 MW of projects have been developed.

This activity is creating jobs. Contractors who might otherwise be laying off people are hiring instead. PSE&G is working with suppliers, including small companies. One is a company called Petra Solar, with which PSE&G contracted to supply 200,000 solar units being deployed on utility poles. These efforts are expected to create more than 2,000 jobs.

Utility involvement can be instrumental in providing universal access to energy efficiency and renewables, at a lower cost than would otherwise be possible, generating jobs along with green energy. But as noted above in connection with efficiency projects, this involvement is predicated on regulatory mechanisms that allow utilities to earn a return on these investments and that provide for prompt cost recovery. The cost recovery mechanisms approved by the Board for PSE&G's solar investments provide a contemporaneous return on these investments – a feature that provides the necessary incentives to deploy the required capital expenditures. This is the 21st century approach to universal access for consumers.

B. Wind Power

PSEG subsidiary PSEG Global has teamed with Deepwater Wind to create Garden State Offshore Energy (“GSOE”) a 50-50 joint venture that was selected by the State as a partner in developing offshore wind in New Jersey. PSEG Global and Deepwater Wind are developing the Garden State Offshore Energy Project. In 2008, this joint venture proposed a 350 megawatt wind farm, 15 to 20 miles off the coast, southeast of Atlantic City. Offshore renewable energy is New Jersey's most abundant renewable resource and must be fully utilized to realize the State's energy goals of achieving substantial emissions reductions and diversifying the State's energy resources. Importantly, this industry has the potential to create thousands of New Jersey jobs up and down the manufacturing supply chain and to provide for better utilization and expansion of the State's port infrastructure to assemble, install, operate and maintain offshore wind farms.

One critical factor that will determine New Jersey's success in attracting these jobs will be the State's ability to establish, on a timely basis, a program that will ensure the development of a meaningful amount of offshore wind farms constructed in a sustained, orderly queue. This cannot happen without the timely implementation of the regulations required to implement the offshore wind program created by the Offshore Wind Economic Development Act that was recently signed by Governor Christie. The Administration, the Legislature and the Board are to be commended for developing a solution that protects ratepayers and creates a mechanism that provides project owners and lenders with the confidence to move forward to develop and finance projects and

importantly, fits within the current BGS construct. It is also important to note that this program will be a long-term effort and requires an ongoing effort for the developers, the State, industry and the Federal permitting agencies to work together to realize the emission-free energy and job creation potential of offshore wind.

C. Timing

The State must recognize that unless it acts quickly and decisively, the opportunity to implement its vision for renewable development will be lost or at least severely compromised. Although the debate is still continuing, there is a growing chorus of advocates for the development of wind plants in the Midwest and the construction of massive transmission corridors into the population centers of the East. Should this vision of the future come to fruition, the opportunities for development of extensive renewables in New Jersey will be diminished.

Two recent federal policy initiatives are headed in the direction of a “wind by wire” construct whereby midwestern wind farms would supply eastern population centers thus displacing the potential for locally produced renewables output. First, FERC is currently considering a rulemaking under which regional transmission planning would need to take into account “policy” goals such as renewables development. Constructing large transmission lines from the Midwest to the East is widely perceived as an obvious “fix” to help achieve this policy. While there are dissenters – including PSEG, the state of New Jersey and nine other northeastern states – who do not agree that the FERC should be deciding environmental policy especially in areas in which the states have taken the lead, there is support in many quarters for this approach.

A second federal initiative that has the potential to influence renewables development is the Eastern Interconnection Planning Collaborative (“EIPC”). This organization which exists under the auspices of the Department of Energy is designed to conduct long-term transmission studies and identify gaps in transmission planning relative to state, regional or national policy goals. Within EIPC, in addition to a base case study, the States and other stakeholders have the ability to request the preparation of scenario studies. A strong contingent within EIPC is calling for a “wind by wire” scenario study which will likely be used as a vehicle to pursue backbone transmission projects.

New Jersey’s best defense against these initiatives being realized would be to have a clear plan for implementing local renewable projects and to take aggressive steps to implement its plan. If New Jersey and other eastern states can demonstrate that their targets for renewables will be met by local renewable facilities, the rationale supporting the claimed need for backbone transmission projects will be eliminated.

V. Clean Central Station Power

A fourth element that should be included in the Energy Master Plan strategy is clean central station power. As of today nuclear power remains the one proven technology capable of the producing carbon-free base load electricity.

New nuclear base load generation will be a critical contributor to meeting New Jersey’s

energy needs with carbon-free power. The development of new nuclear power is essential if the climate change crisis is to be addressed in a meaningful way. Many leading institutions focused on climate change have unequivocally determined that nuclear power must be a part of the solution.

Changes in EPA air regulations for fossil-fueled generation (Clean Air Transport Rule, Mercury and Hazardous Air Pollutants MACT rules), the age of New Jersey's existing units and the eventual retirement of one of New Jersey's carbon-free sources, the Oyster Creek Nuclear Station, will all increase New Jersey's need for clean base load power.

The development of a new nuclear plant, moreover, would bring many collateral benefits in addition to helping to address climate change. Foremost among these collateral benefits would be thousands of good paying jobs. This would hold true during both the construction and operating phases. A new nuclear unit in New Jersey would employ 1,800 - 2,400 people during construction, with peak construction employment reaching as high as 4,000 workers. Once operating, the site would provide 400 - 700 permanent positions with stable long term salaries typically 36% higher than salaries in the local area.

There are over fifty companies with facilities in New Jersey that are nuclear suppliers. Areva, Burns & Roe, Day & Zimmerman, Hitachi, Holtec, The Shaw Group, and URS Corporation are all companies in the nuclear supply chain and have over 3,700 employees in the State. The development of a new nuclear plant in the State would provide a tremendous opportunity to procure goods and services from local New Jersey businesses. For example, the construction of a new nuclear unit would require 400,000 cubic yards of concrete, 66,000 tons of steel, 44 miles of piping and 300 miles of electrical wiring.

Current Nuclear Energy Institute ("NEI") studies indicate that approximately \$430 million annually in sales of goods and services in the local community are procured as a direct result of new unit operation. In addition, the unit would provide state tax revenue of approximately \$70 million and federal income taxes of \$250 million.

Throughout this process, a number of stakeholders have commented and requested expansion of the current Class I and Class II REC definitions to include technologies such as combined heat and power, geothermal and other resources that do not meet the current generation source requirement. It is inconceivable that a discussion around New Jersey's policy on low and zero-carbon generation sources would not include the nuclear option. By way of example, a new 1,350 MW carbon-free nuclear unit would provide approximately 10% of the state's total energy needs and would be equivalent to nearly half (45%) of the current 22.5% RPS requirement. A new unit will also offset the emission of more than six and a half million metric tons of greenhouse gases each year. This is equivalent to removing more than one million cars from New Jersey's roadways.

Developing new nuclear power, however, poses special challenges. The Energy Master Plan should recognize these challenges and include the task of finding a role for the State in helping private industry to mitigate the risks as part of the clean energy programs to

achieve the energy, environmental and economic goals of the State. PSEG stands ready to work with the State of New Jersey to find ways to address these issues.

VI. Comments on Data Collection

PSEG commends the efforts of the Center for Energy, Economics & Environmental Policy at Rutgers University to compile data for the purpose of facilitating the discussion of issues presented in the Energy Master Plan process. PSEG believes that, in general, these materials will be useful to all stakeholders in informing the debate.

PSEG does believe that one aspect of the presentation of the materials may be misleading. The presentation purports to develop a “New Jersey Electricity ‘Rate’” for 2009 as a build-up of various components of electricity charges to New Jersey consumers. Among the elements comprising the buildup, “PJM RPM Cost” and “PJM Energy Cost” are included. In addition, a footnote indicates that these values are from the PJM administered markets and that they do not take account of “NJ BGS auction prices.”

PSEG believes that the use of PJM market values instead of BGS values does not provide a fair representation of the costs to consumers. The PJM capacity and energy prices represent prices for narrowly defined products provided by those markets. In contrast, serving load in New Jersey (or anywhere) requires the load serving entity to provide additional energy management services whose costs are not captured through pricing in those markets.

Notably, energy and capacity price levels as an after-the-fact calculation fail to take account of the “load following” costs associated with meeting the requirements of constantly fluctuating consumer demands. Load serving entities need to hedge against these risks by maintaining a fleet of generating units with load following capabilities or through procuring load following capabilities from others or, if they chose to rely upon the PJM market for load following, to build in some margin to compensate for short-term load and price fluctuation risk. Similarly, these calculations fail to take account of risks associated with longer-term changes in price levels. For example, suppliers will generally need to hedge at least a portion of their obligations through long-term financial arrangements with other companies to manage fuel costs risks. Finally, the direct costs and administrative expenses of managing supply risks are also ignored in this analysis.

A superior approach would be to utilize the BGS rate to represent the commodity costs of serving customers. Effectively, through the competitive auction process, this rate sets forth the consensus view of large, experienced suppliers of the commodity cost for serving load in New Jersey.

VII. Conclusion

PSEG appreciates the opportunity to take part in the development of the Energy Master Plan. PSEG respectfully submits that efforts should focus on the four areas identified in these comments:

- Maintaining Reliability and Supply Adequacy at a Fair Price
- Energy Efficiency
- Renewable Technologies
- Clean Central Station Power

Concentrating on these areas has the greatest potential for helping the State to meet the challenging environmental and economic issues that it faces.

Dear President Solomon and Esteemed members of the board,

Thank you for holding the EMP discussion meetings, I found the meetings for the most part very constructive.

Ray Angelini Incorporated is the largest EPC, (engineering, procurement and construction), Contractor on the East Coast in the solar industry. We have installed over 60 megawatts of PV solar to date with another 50 megawatts in our pipeline this year. This accounts for 30% of all installed solar in New Jersey. We focus our business in the commercial, industrial and municipal sectors. We employ 375 people in full time positions at present, up from 300 just two years ago with a current hiring rate of 1 additional person per week to our full time staff. Our company's growth and job creation ability has direct correlation with the 2008 Energy Master Plan and Assembly bill 3520.

I would like to offer the following for your consideration when revisiting the EMP;

The testimony given by Terrence Sobolewski from SunPower Corp. was **spot-on**. The cost of solar to rate payers has been shown to be only a small fraction of one penny. The cost of solar installations have dropped approximately 30% just in the past two years with anticipated further decline. The SREC market will find its own balance through supply and demand as more solar comes on line.

Our industry has determined that for every megawatt of solar installed, 40-50 jobs are created. I know that RAI alone have put hundreds to work at the installation levels alone.

On a daily basis, our finance division is in close contact with many different PPA providers that are capitalized by private investment groups from the U.S. and abroad. A3520 has offered the security to the capital investors to pour hundreds of millions of dollars into the New Jersey solar market due to confidence in the 15 year REC market and the goals set forth in the Solar Advancement and Fair Competition Act. If these investors sense "*legislative risk*" to the SACP or the RPS, no doubt the purse strings will tighten and work grind to a trickle. Our conventional commercial lenders are far more risk sensitive and have yet to fully engage in solar finance. We have created the most thriving industry in the state. We should not upset the balance of components that has proven to be successful.

To attract the renewable energy manufacturing sector to New Jersey, we first must solidify the market and region that is their customer base. A manufacturer wants to see a minimum of 15 year life and growth potential in their market and region in which they choose to deploy. The SREC based market is working and working well. We strongly urge the Board not to fix what is not broken and to please establish the SACP out to 2025 as per A3520.

Thank you for this opportunity to comment.

Respectfully Submitted,

David Sharrow

**Solar Energy Division
Project Manager
Division of Regulatory and Legislative Affairs**



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RENEWABLE ENERGY – CRITICAL ISSUES

I. COMMUNITY SOLAR

The BPU and its NJ Office of Clean Energy has promised community solar regulations for many years. Such regulation is certainly permissible under existing New Jersey law. The BPU must move forward and take a leadership role to establish comprehensive community solar regulations and guidelines under the existing NJ Net Metering Statutes for **residential, municipal and commercial interests**. Community solar is critical to renewable energy development, economic recovery and jobs in New Jersey. It is time to represent the public interest and promote the intent of our legislature and to be expansive and forward thinking in our energy policy!

II. LINE CAPACITY

1. If “**limited line capacity**,” particularly in South Jersey, prevents any net metering customer from establishing an interconnection agreement for a renewable energy generator then the local utility has not met its legal duty to maintain and upgrade distribution lines to meet the demands of “**general growth**.” Net metering of renewable energy generators is “**general growth**” comparable to the line upgrades required of utilities in the past for the growth of air conditioning, color TV’s, refrigerators and other new technology. Furthermore, the failure of a local utility to remedy “**limited line capacity**” issues for net metering customers subverts the mandate of New Jersey law and New Jersey energy policy ordered by the legislature.

Energy cost savings from net metering renewable energy generators is essential to commercial development, jobs and economic recovery in South Jersey! “**Limited line capacity**” without a solution provided by BPU leadership is not acceptable!

2. The BPU must provide a fair and impartial definition of “**line capacity**” with leadership to provide proper oversight and a solution to the issue of “**limited line capacity**.” New Jersey utilities are charged with the duty to maintain the public grid to distribute electricity in our area in exchange for a monopoly exception to antitrust laws and as such must be required by BPU to meet the demands of “**general growth**.”
3. With the untenable situation of “**limited line capacity**” in South Jersey, large renewable energy projects for PJM wholesale electric sales must not be allowed to prevent net metering projects from gaining an interconnection

agreement with the local utility. BPU policy must assure that **“limited line capacity”** does not substantially impair the rights of New Jersey municipalities and the rights of each and every one of its citizen’s to participate in NJ Net metering Statutes and NJ Renewable energy policy which is in place to benefit NJ residents.

III. **SREC MARKET**

1. **The BPU energy policy must establish clear long term certainty in the SREC market** and maintain SREC market viability! Solar generator owners and investors were given a **“regulatory promise”** that SREC’s were the new method of finance for solar projects to replace the rebate system. **Solar generator owners have relied on that promise** to build and pay for solar projects with long term investments and loans! Mismanagement and uncertainty in the long term SREC market will stop solar development, economic growth, jobs and recovery in NJ and could cause solar project bankruptcies. Moreover, the current uncertainty in the SREC market is presently preventing local banks from considering SREC’s as collateral and preventing them from lending money for essential solar projects.
2. The SREC market exists entirely by regulation and must be properly managed. If the SREC market is allowed to falter in uncertainty, solar finance that relied on long term SRECs and solar development will fail. It is disingenuous to merely suggest that the “free market” controls SREC prices and that SREC values cannot be maintained!
3. The underlying SAC P's are suppose to be a “penalty for utilities” that do not meet the NJ legislatures’ minimum statutory requirements to produce 4% of their electricity from renewable energy sources. The BPU policy should prevent utilities from passing on the cost of SRECs to essentially “penalize” rate payers for the utility’s failure to meet New Jersey statutory requirements. The utilities need to stop passing their legal duty to rate payers, honestly get with the clean energy program and view the independent development of renewable energy as an asset that allows utilities to meet their New Jersey statutory requirements for clean energy in our state. The BPU must not allow utilities to side step New Jersey law!

IV. **EQUAL STANDING – FOR ALL RENEWABLE ENERGY TECHNOLOGIES**

The BPU must establish “**equal standing**” for all renewable energy technologies within its energy policy and not favor one technology over the other! For example, **wind, hydrokinetic, ocean wave and tidal generator projects** and all other emerging clean energy technology projects **must receive the same benefits and incentives as solar projects.**

- A. All renewable energy technologies must be included in the SREC / “green credit” market so that all viable clean energy technologies can develop and benefit New Jersey with new jobs and economic recovery.
- B. BPU policy must create real incentives to manufacture all types of clean and renewable energy equipment in New Jersey.
- C. Why not allow SREC’s or a “green credit” equivalent for renewable energy equipment that is manufactured in New Jersey?

Thank you for posting my comments to the BPU Energy Management Plan.

Sincerely,

William C. Skye

COMMENTS OF THE SOLAR ALLIANCE
ENERGY MASTER PLAN STAKEHOLDER MEETING
SEPTEMBER 24, 2010

The Solar Alliance is a group of approximately 30 of the largest photovoltaic (PV) solar development and manufacturing companies in the United States. We work together to advance state legislative and regulatory policies that support solar energy and help capture associated economic development opportunities. And we strive to increase the number and capacity of solar installations of all types, ensuring the market is vibrant, competitive and diverse.

Introduction

Over the last few months, there has been extensive dialogue between staff members from New Jersey Board of Public Utilities, the Bloustein School of Planning and Public Policy at Rutgers, Department of Environmental Protection, Department of Transportation and others represented in several working group discussions. As a result of this dialogue and substantial analytical efforts, we find ourselves in an excellent position to evaluate the real impact of the Energy Master Plan policies to date, and to refine these policies in such a way as to yield even greater social and economic benefits for the State and its citizens.

With regard to solar energy, we'd like to address some of the benefits that have already been realized as well as the longer term economic impact associated with the solar development trajectory envisioned in the Energy Master Plan and the Solar Advancement and Fair Competition Act. Within this, we'll share specific points regarding job growth, projected electricity savings for NJ rate-payers, and opportunities for SREC cost reduction.

We in the solar industry are compelled to constantly address the solar value proposition; working to expand benefits, while eliminating or minimizing system costs and ultimately rate-payer impact. Right now, we have the fantastic opportunity to do both.

Key Considerations

- First, the solar requirements in the EMP are modest. The Solar Advancement Act is a reasonable response to the opportunity and needs for economic development and clean electricity for New Jersey. In fact, Solar and other renewables can contribute much more than the current EMP assumes, and the State plays a critical role in getting there:
 - As demonstrated in previous comments by the Solar Alliance, solar alone can supply 14 GW of capacity, and provide a substantial percentage of the gap in new generation that the EMP predicts.
 - New Jersey has already put in place key building blocks to realize its solar potential. The Solar Energy Advancement and Fair Competition Act has set the stage for nearly 5GW of solar energy by 2026 and with further market enhancements solar will continue to deliver competitively-priced electricity.

*The views expressed in these comments are those of the Solar Alliance
and not necessarily those of any individual member company.*

- Moreover, the benefits of solar as an economic development tool should not be overlooked. With an installed base of over 6,000 systems in NJ, representing 200 MW of total capacity, this means more than 6,000 businesses and residents are now receiving the benefits of lower energy costs and a return on their local investment in infrastructure. Like CHP, EE and other distributed technologies, the systems and improvements are owned by or operated on behalf of host customers, who then directly benefit from predictably priced electricity and any associated incentives. In this way, Solar power acts as a powerful hedge against volatile and generally rising energy costs, allowing these New Jersey-based businesses to retain jobs and invest the savings in their operations.
- Second, the levelized costs of solar electricity should be considered within the context of a portfolio approach for the electricity mix in the State. The very purpose of the Energy Master Plan is to take a long-term view and enable policy makers to create a portfolio that balances short term costs versus long term rate stability. While development of PV may entail a modest (and declining) incentive in the short-term, this investment will facilitate the establishment of a self-sustaining solar market that is capable of delivering a significant part of the state's overall electricity supply at prices that are cost competitive with conventional generation technologies.
- Third, in considering costs, we must also consider countervailing benefits. In the case of solar energy, these benefits are both significant and varied.

Costs:

- For rate-payers, the current cost of solar in the average NJ residential utility rate is about \$0.0017 or less than two tenths of a penny. (a)
- Relative to other technologies, the levelized cost of energy for solar is currently \$0.13 - \$0.30/kWh (depending on location, scale, technology, etc). For power plants, solar is cheaper than gas peaking and nuclear, and delivers energy at a discount to peak prices in four of the top ten metropolitan areas including New York, Philadelphia, Houston and Boston. (b)(c)(d)(e)
- And unlike most other technologies where costs are increasing, the cost of solar is DECLINING at about 3% per year (long term trend) which means the economics will continue to improve. (f)(g)

Benefits:

- To date, the New Jersey solar industry now includes about 200-300 companies employing more than 3,000 people. (h)
- It is one of the few segments in the NJ State economy that is growing and drawing increasing amounts of private investment. The state has about 200MW of solar energy installed and is installing about 10MW per month. In fact, the run rate of solar installations doubled from 2008 to 2009 and doubled again from 2009 to 2010.
- 200MW represents more than \$700 million of leveraged investment on the part of residents, businesses and financial institutions.
- Solar energy reduces our in-state wholesale electricity prices. We estimate that 5,000MW of solar energy could reduce peak LMPs by more than \$50/MWh which would generate about a \$460 million annual benefit across all rate payers. Moreover, as energy prices increase, these benefits increase proportionally. (i)(j)(k)

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Some may argue other technologies generate these same benefits. That may be true but the magnitude of the benefit varies based on the nature of the technology. For example, solar has been proven to create more jobs per MW of installed capacity than other technologies (6X more than nuclear and 8X more than natural gas and coal generation) driven in part by its distributed nature. It is also true that all technologies enjoy some form of subsidy whether it is Federal Loan Guarantees for nuclear, tax credits for fossil fuel producers or direct R&D funding by DOE for both. Any accurate comparison then must take into consideration all of the accumulated costs and all of the economic benefits.

These points are based on the CEEEP analysis, a review of current electric utility tariffs, the NJ CEP Revised 2010 Budget Order (dated 4/21/2010), an LCOE study by Lazard, and nuclear cost study by Duke University, a compiled list of solar companies in NJ, NJ CEP monthly reporting, solar pricing available from Open PV and Lawrence Berkeley National Labs, and analyses of the PJM pricing model that have been conducted by Black & Veatch, a team at SUNY Albany, JBS Energy and PJM themselves.

Policy Recommendations

Looking ahead, we have a great opportunity to further leverage solar as a key component of our generation mix, an opportunity that will deliver vast economic and environmental advantages in a time where we desperately need both. To build on our progress to date and to continue capturing this great opportunity, we offer these broad policy recommendations:

- **Drive Scale and Efficiency:** New Jersey will benefit from continued efforts to develop a diverse solar market that includes everything from small distributed residential systems to larger commercial and grid connected projects.
 - In light of this, we should address interconnection barriers by improving existing interconnection rules and by expanding SREC eligibility for projects interconnected at higher voltages.
 - Specifically, we support some of the language proposed in A2529, namely SREC eligibility for systems interconnected at 69kV or less.
- **Promote a Stable Investment Environment:** New Jersey has already realized substantial benefits from its renewable energy goals and now is not the time to create uncertainty in the market. Consistent state policy is the most important determinant of bringing down SREC prices in the coming years.
 - The policy mechanisms in the state for enabling lower priced SRECs are evolving but need enhancements, particularly through improvements to the existing SREC finance programs and the addition of long term SREC procurement in the BGS process.
 - We support improvements to existing SREC financing programs and we recommend exploring additional securitization options.
 - We also believe it is critical to encourage more LSE long-term contracting. To do so, we must set a proper 15 Year SACP schedule that establishes clear parameters and incentives for these LSEs.

In concluding, we would once again thank the Board, staff, and all those who participated in the previous EMP Policy Task Force discussions. We will continue to work with you and all parties to ensure that the goals of the state are achieved in the most cost effective means possible.

The views expressed in these comments are those of the Solar Alliance and not necessarily those of any individual member company.

Supplemental Comments – SREC Markets (Pricing, Supply and Demand)

Regarding SREC prices, there is both a short-term, more speculative market and a long-term, more stable market for trading SRECs. As a result, there are substantial differences in the trading prices for SRECs:

- Through April 2010, the year-to-date overall weighted average SREC price for all trades was \$573.77.
- According to Flett Exchange, a well-known broker of NJSRECs, the spot market has traded between \$640 and \$680 for this compliance year.
- According to BPU reporting, trades in this range (spot trades) accounted for about two-thirds (68%) of all trades and the weighted average of these trades was \$676.
- We may assume then the other one-third (32%) was sold through long or short term contracts or auctions. Here the overall weighted average price was \$373.
- Note: This contract/auction SREC price of \$373 is nearly half of the ACP (currently at \$693). Moreover, the weighted average contract price for buyers listed in GATS as LSEs exclusively was even lower at \$276.14 while the weighted average contract price for all others was \$411.02.
- Together, this suggests there is an active market beyond spot trades, but it is not yet a sufficient percent of the total to drive overall SREC prices to more reasonable levels.

Over time, SREC prices will be driven principally by supply and demand. However, as with any developing market, we should expect periodic, short-term variances in these market forces. The success of existing policy and market mechanisms then must be evaluated over a long enough period of time to avoid whip lash reactions.

Regarding near term SREC supply and demand, a short review of our progress to date gives us great insight on where we can expect the market to be in the next 12 to 18 months.

- According to NJCEP, New Jersey solar installations now provide nearly 200 MW of installed capacity from more than 5,000 projects.
- This number is increasing by about 8-10 MW per month according to SREC registration data or about 100 MW annually.
- There are now about 1.5 GW of merchant solar projects at various stages of the PJM interconnection process. If 15% of these projects reach commercial operation, that would add another 225MW.
- Taken together, this could conservatively put NJ at about 300 MW of installed capacity by June of 2011 (vs. an obligation of about 280 MW) and as much as 600MW of installed capacity by June of 2012 (vs. an obligation of about 400 MW). Of course, to achieve these levels of installed capacity, certain potential constraints will have to be resolved such as interconnection issues in the southern part of the State, SREC eligibility for projects connected at 69kV and below, and approval of an appropriate 15-year SACP schedule.

In conclusion, the data does not support concerns that the near term shortfall will persist. The industry is clearly responding to the goals set forth and we can expect a reasonable balance in supply and demand to be achieved over the next 24 months. Further, the likelihood of near term balance is increased as the noted constraints (interconnection issues, SREC eligibility, and SACP schedule extension) are successfully resolved.

References

Note: We use levelized cost of energy (LCOE) to compare the cost of generation technologies as it includes capital costs, O&M, and fuel costs. Further, solar should be considered against what it might replace (i.e. peak generators first, then intermediate and base load generators).

- (a) *EMP Additional Preliminary Data - Average Residential Utility Rate*
[[http://nj.gov/emp/docs/pdf/Avg_Residential_Utility_Rate\(8-31-10\).pdf](http://nj.gov/emp/docs/pdf/Avg_Residential_Utility_Rate(8-31-10).pdf)] and NJ BPU CEP Budget Allocations.
- (b) *Lazard 2009 Study shows solar at \$131-196/MWh and prices have declined since then. This appropriately includes Federal Tax incentives but no other local or state incentives. Further, Lazard points out that the LCOE would be under \$0.10/kWh (\$87/MWh) by 2012 using a leading solar company's projected costs.*
[http://blog.cleanenergy.org/files/2009/04/lazard2009_levelizedcostofenergy.pdf]
- (c) *NREL LCOE Calculator returns \$0.174/kWh using 30 year term, 8% discount rate, \$4/Watt Capital Cost (Average Selling Price, Commercial System), 30% ITC, 17% Capacity Factor.*
[http://www.nrel.gov/analysis/tech_lcoe.html]
- (d) *Lazard 2009 Study shows Gas Peaking at \$216 - \$334/MWh.*
[http://blog.cleanenergy.org/files/2009/04/lazard2009_levelizedcostofenergy.pdf]
- (e) *According to Duke University Study, "Commercial-scale solar developers are already offering utilities electricity at 14 cents or less per kWh. Duke Energy and Progress Energy are limiting or rejecting these offers and pushing ahead with plans for nuclear plants which, if ever completed, would generate electricity at much higher costs — 14–18 cents per kilowatt-hour according to present estimates."* [http://www.ncwarn.org/wp-content/uploads/2010/07/NCW-SolarReport_final1.pdf]
- (f) *Lawrence Berkeley National Labs cites 3.5% per annum average decline.*
[<http://eetd.lbl.gov/ea/emp/reports/lbnl-2674e.pdf>]
- (g) *Open PV shows a 3.2% decline in the US over the last 9 years.* [<http://openpv.nrel.gov/gallery>]
- (h) *Navigant Consulting - 100 MW of Distributed Solar PV Supports 1,500 to 3,000 direct and 6,690 to 13,380 indirect/induced jobs.*
- (i) *NJ Peak Energy prices (LMP) in 2001 to 2009 ranged from \$156 - \$378/MWh.* [CEEPP EMP Prelim Data 8/13/2010]
- (j) *Wholesale electricity price reduction analysis was completed by drawing on similar studies done by PJM, JBS Energy, and Mr. Richard Perez of SUNY Albany.*
[Mid-Atlantic States Cost Curve Analysis, JBS Energy, Inc., Dec 2000]
[<http://www.asrc.cestm.albany.edu/perez/directory/LoadMatch.html>]
- (k) *Black & Veatch also completed a similar analysis of the proposed changes to Pennsylvania's alternative energy portfolio standard. They estimated the total wholesale price suppression benefit of an Alternative Energy Portfolio to be as much as \$3.5 to 6.2 billion over the life of the study, a portion of which would come from solar with a solar target that was nearly identical to New Jersey's.* [http://www.cfalleghenies.org/pdf/aepss_executive-summary.pdf]

The views expressed in these comments are those of the Solar Alliance and not necessarily those of any individual member company.

From my participation this morning in the forum. This is posted on our website:

Advocating for communities & efficiency at Trenton BPU forum



This morning, I headed up to Trenton to participate in the Energy Master Plan (EMP) Stakeholder Open Forum: Proposed Changes and Future Outlook. This meeting was the third of three efforts to engage the NJ public in Governor Christie's to evaluate the 2008 Energy Master Plan passed by Governor Corzine. The current administration and its appointed BPU President, Lee Solomon state that the goal of re-evaluating the EMP is to "Ensure that NJ continues to have reliable energy at reasonable rates" and list the "building blocks of a diverse and secure energy future that must balance three critical elements: reliability, safety and affordability". A description of the meetings indicated the need to discuss "2008 assumptions and the differences between those assumptions and the current economic conditions". Today, the entire session was dedicated to allowing NJ stakeholders the opportunity to weigh in on the future of the EMP.

As it stands, the EMP sets goals of reducing greenhouse gas emissions (GHG) 20% by 2020 and 80% by 2050. According to the NJ State Sustainable Institute (NJSSI) 2007 Climate and Energy in NJ report, "aggressive implementation of existing alternative fuels, efficiency measures and energy taxes" can result in achievement of the shorter term 2020 goals, but that the long term 2050 goal "will require a whole new slate of measures and technologies that have not yet been identified". Huh? So that means that we have set a goal that needs us to do something that we have not yet figured out how to do. I guess that's a good reason to re-evaluate the plan with an eye for being MORE aggressive with our efforts to figure out how to decrease our GHG. However, given the above stated "building blocks", it seems like we may be heading for a scaling back GHG reduction efforts instead.

I appreciate that the Governor and the BPU have a tremendous challenge on their hands as they attempt to evaluate and implement strategies to increase our state's use of clean energy and to make our homes, businesses and governments more energy efficient. I wanted a community, personal voice to be heard among the agendas of the nuclear, solar, wind and building industries and lobbies. As I raised my hand and walked up to the microphone, I hoped that I would be able to represent my children in this conversation. I started by fast forwarding 30 years to a day when my kids would be about my age. I imagined them shaking their heads and pointing their fingers at our generation for our lack of insight and planning for the future. How could we not see that a healthy planet is necessary for a healthy economy in the long run? I talked about how in order to achieve statewide targets, commensurate reductions must be made at the local level. I quoted from a 2009 report commissioned by the BPU from NEEP (NE Energy Efficiency Partnership) which described municipal and community efforts to decrease GHG through adoption of local government climate goals, participation in existing programs for energy efficiency, adoption of sustainable land use planning provisions, green building of new public buildings and more. I added in the recent success of Sustainable

Jersey (over 300 towns registered), the EPA Climate Showcase Community grant given to Cherry Hill, Montclair and Highland Park and the popularity of community sustainability groups such as SCH. The NEEP report indicated, "The potential of community based strategies has barely begun to be realized. To achieve this potential, communities need more resources and support to move forward and have more impact". I implored the committee to approach the re-vamping of NJ Clean Energy in a smart way- increasing program efficiencies and continuing focus on residential and commercial energy efficiency incentives. After all, the energy we DON'T use is the cleanest energy of all, with resulting new green jobs and the best return on investment of any GHG reduction efforts. We need intelligent long term thinking to find our way out of this problem. Unfortunately, short term election cycles, economic reporting and public attention deficit disorder tend to result in dangerous regulation and policies.

It was a little intimidating to sit up there trying to explain my perspective, but I'm glad that I had the opportunity. If you would like to weigh in on this evaluation of the EMP, send your comments to empadmin@njcleanenergy.com. I'm sort of uneasy about the outcome of this revisiting of the EMP. I hope that the commissioners and senior staff who sat up on the dais in that committee room at the Statehouse in Trenton heard me just a little bit!

Lori

**Lori Braunstein,
Executive Director**

Sustainable Cherry Hill

A 501(c)3 Non Profit Organization

"Don't wait for anyone to deputize you or authorize you or empower you. You have to just start out with yourself...and put one foot in front of the other."

Hazel Henderson

Dear Administrator,

I was invited to a series of meetings regarding the 2008 Energy Master Plan and its possible revision. As a true Energy Stakeholder, I am very willing to contribute to participate in any way that is necessary.

My background and reason for contributing is the following:

I am President of the New Jersey Electric Auto Association and we expect the number of Electric Vehicles in the state to skyrocket over the next 5 years. I am also serving on the National Electric Auto Association Board of Directors which has membership in the 10s of thousands range and I am the owner of a business that specializes in turning a normal gas car into a BEV or PHEV.

Therefore, I am concerned for the availability of Energy for these purposes and want to make sure the Board of Public Utilities is considering the large scale adoption of EVs within the state of NJ.

Sincerely;

Douglas A. Stansfield
President