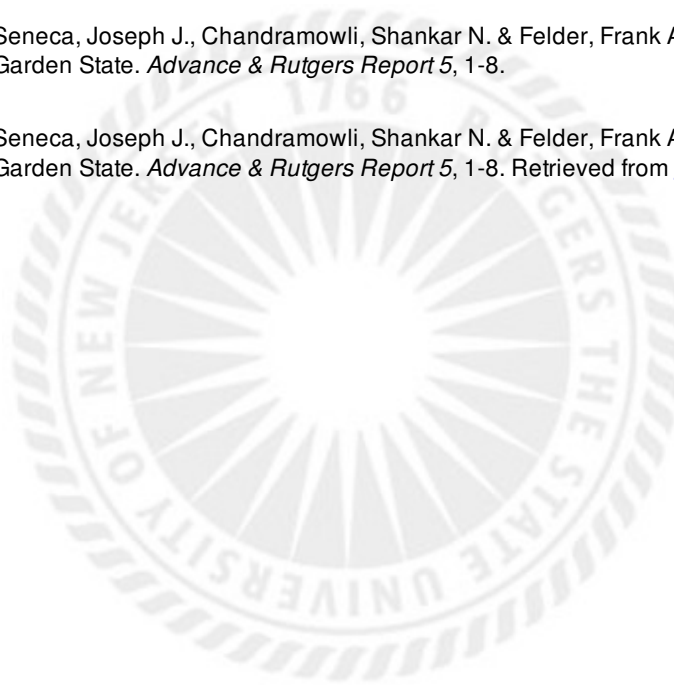


Solar Power in the Garden State

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ADVANCE & RUTGERS REPORT

Issue Paper Number 5 • May 2011

An Analysis of Economic,
Business & Demographic Trends

SPECIAL ISSUE: Solar Power in the Garden State

See page 3

A Message from Advance Realty

by Peter J. Coccoziello



Peter J. Coccoziello

In this latest issue of the *Advance & Rutgers Report*, guest columnists Shankar N. Chandramowli and Frank A. Felder, PhD, Director—Center for Energy, Economic and Environmental Policy at the Edward J. Bloustein School of Planning and Public Policy at Rutgers, examine the significant issue of solar power in New Jersey. As detailed in the report, the Garden State faces a number of energy challenges in the coming years including fluctuating oil prices and the uncertain future of nuclear power generation, but stands as one of the fastest adopters of solar energy resources.

New Jersey has been leading the way by instituting some of the most aggressive solar and renewable energy policies in the nation, as well as establishing a model program for solar development that is starting to have promising results. By the end of 2010, New Jersey had the second highest solar installation capacity in the country. Ten years ago, the state had six solar installations; as of February 2011, that number stands at more than 8,000.

As an owner and developer of real estate in New Jersey for more than 30 years, Advance has keenly watched the interest in renewable energy sources grow, (continued on page 2)

Shining Brightly: Bloustein's Centers of Excellence



James W. Hughes



Joseph J. Seneca

by James W. Hughes and Joseph J. Seneca

This special issue on energy and solar power in New Jersey was made possible because of the extensive portfolio of research centers and institutes at the Edward J. Bloustein School of Planning and Public Policy. Dr. Frank A. Felder, an Associate Research Professor, has been director of the School's Center for Energy, Economic & Environmental Policy (CEEEP) since 2006. Frank is a nuclear engineer with a PhD degree from MIT, and he, along with his CEEEP colleague, Shankar N. Chandramowli, coauthored the main article in this issue of the *Advance & Rutgers Report*. CEEEP has worked extensively with the New Jersey Board of Public Utilities on projects, including New Jersey's current Energy Master Plan.

The Bloustein School is among the nation's best public policy and planning schools and is able to address local, state, regional, national, and international policy and planning issues with expertise and credibility. The school is a leader in such areas as smart growth, transportation planning, workforce (continued on page 2)

James W. Hughes and
Joseph J. Seneca, Editors



ADVANCE
REALTY

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Edward J. Bloustein School
of Planning and Public Policy

A Message from Advance, continued



Installation of solar carports.

© KDC Solar.

recognizing the positive impact solar energy has had on the industry, the economy, and the environment.

Recently, we at Advance Realty launched Advance Solar Properties, a division focused on providing New Jersey corporations with creative solar solutions. As part of this effort, we have formed a strategic alliance with KDC Solar, an industry-leading builder, owner, and operator of commercial solar projects.

This new division is a part of our continuing commitment to identifying and delivering the most advantageous solutions for the real estate needs of companies and property owners in New Jersey. Exploring solar power as a resource is one way to help businesses reduce energy costs while also benefiting the environment. More businesses are learning that what is good for business can also be good for the environment, and that is ultimately good for the New Jersey economic climate as well.

Once again, we commend the faculty at Rutgers for providing *renewable resources* of another kind. The preeminent research university provides business owners in New Jersey with a wealth of thought leadership and intellectual capital through research highlighted in reports just like this one. These valuable resources help businesses further their own goals and objectives, as well as contribute to the economic development of the state as a whole. ■

Peter J. Cocoziello is President and CEO of Advance Realty.

Shining Brightly, continued

development, energy policy, and environmental health, and builds on its association with research centers in related areas.

Joining CEEEP within the Bloustein School are other centers and institutes, as listed below:

- Alan M. Voorhees Transportation Center
- Bloustein Center for Survey Research
- Bloustein Online Continuing Education Program
- C-Suite Survey
- Center for Negotiation and Conflict Resolution
- Center for Planning Practice
- Center for Transportation Safety, Security and Risk
- Center for Urban Policy Research
- HIV Prevention Community Planning Support and Development Initiative
- Initiative on Regional and Community Transformation
- Institute for Meadowlands Studies
- John J. Heldrich Center for Workforce Development
- National Center for Neighborhood and Brownfields Redevelopment
- National Transit Institute
- New Jersey Public Policy Research Institute
- Professional Development Institute
- R/ECON™ Forecasting Service
- Rutgers Center for Green Building
- Rutgers Regional Report / New Jersey State Data Center
- The Leading Institute

More information on the Bloustein School's centers and institutes can be found at <http://policy.rutgers.edu/centers/>.

March 2012 will mark the twentieth anniversary of the establishment of the Edward J. Bloustein School of Planning and Public Policy—a two-decade milestone celebrating the marriage of top-notch academics (the Bloustein School was ranked No. 3 in the United States in the latest Planetizen survey of the nation's top graduate programs in urban planning) and cutting-edge research, as evidenced by the inclusive centers and institutes noted above. The outstanding contributions to public policy of Bloustein School centers like CEEEP promise to keep the school's star shining brightly as it enters its third decade. ■

Solar Power in the Garden State

by **Shankar N. Chandramowli** and **Frank A. Felder**



Shankar Chandramowli



Frank A. Felder

New Jersey faces a host of energy challenges. Located at the end of the fuel supply chain, the state must import all of the primary fuels needed to run its transportation system, to generate electricity, and to heat the homes and buildings of its residents and office tenants. In addition, New Jersey is environmentally conscious, with many important laws and policies that are directed at reducing emissions and preserving the environment. Overlay these issues with a severe and prolonged economic recession, and it is not surprising that there are no easy answers when it comes to energy policy.

New Jersey's Energy Mix

New Jersey's transportation sector, like that of every other state, is oil based. Oil prices, as the newspapers remind us almost daily, are driven by international events: economic growth in China, turmoil in the Middle East, and oil spills on the Gulf Coast, for example.

Heating, another major energy sector, depends on natural gas and related fuels such as propane. New Jersey imports natural gas from the Gulf Coast and Canada through large interstate pipelines. Recent technological improvements now enable the cost-effective extraction of natural gas from shale through horizontal drilling and fracking. There are extremely large deposits of shale gas, including in neighboring states of New York and Pennsylvania.

Extracting shale gas raises important environmental issues, among them ensuring that the hazardous chemicals used stay out of drinking water supplies. The combined impact of these new finds and the recession have resulted in natural gas prices dropping from levels of over \$12 per million British Thermal Units (mmbtus) to \$5/mmbtu¹ in the last several years.

Electricity is the third major energy sector. New Jersey is part of a multistate wholesale electricity market, called PJM, that covers thirteen mid-Atlantic and Midwestern states as well as the District of Columbia. Wholesale electricity prices vary based on fuel costs, regional supply and demand conditions, and the capacity of transmission lines to ship power west to east. Power flows in this direction due to the large load centers such as New York City and Philadelphia, as well as the relatively low-cost coal plants located in Pennsylvania and westward.

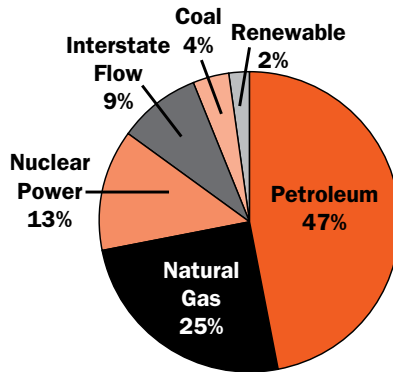
Atypical of most states, 50 percent of New Jersey's in-state generation is produced from its three nuclear power plants—Oyster Creek, Salem (Units 1 and 2), and Hope Creek. The post-earthquake nuclear-reactor crisis that affected Japan in March is bound to add more uncertainty to the future of nuclear power generation in this country. New Jersey also has a mix of natural gas and coal-power plants. Only a very small amount of the state's, region's, and nation's electricity is produced from oil, so the price of oil does not directly affect the price of electricity.

Total energy consumption is the sum total of energy consumed by major sectors within the state: residential, commercial, industrial, and transportation. Nearly half of the total energy consumed in New Jersey in 2008—the last year for which data have been released—was based on petroleum resources (figure 1). Natural gas used in heating and electricity generation contributes to one-fourth of the total energy consumption. Nuclear-based power generation accounts for 13 percent of the total energy by source. Nearly 4 percent is supplied by coal-based electricity generation plants.

Shankar N. Chandramowli is on staff at the Bloustein School's Center for Energy, Economic and Environmental Policy, which **Frank A. Felder** directs.

1. One cubic foot = 1,027 BTU. U.S. Energy Information Administration (EIA)—Natural Gas Prices. Available online at: http://www.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_SNJ_m.htm. Accessed March 14, 2011.

FIGURE 1
New Jersey Total Energy Consumption by Source (2008)



Note: Consumption estimates from various energy sources are converted to BTU units for comparison. The total energy consumption for 2008 (the last year for which this data has been released) was 2,637.1 trillion BTU.

Source: U.S. Energy Information Administration, State Energy Data System (SEDS), New Jersey.

Renewable sources contribute to less than 2 percent of the total energy in all sectors. A positive interstate energy flow indicates that New Jersey imported more electricity than it exported out of state.

New Jersey Has Aggressive Solar and Other Renewable Energy Policies

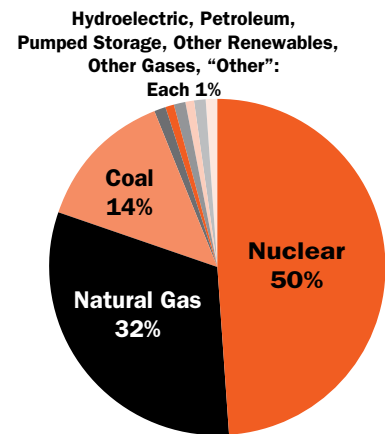
As mentioned earlier, nearly half of in-state electricity generation is from nuclear power sources (figure 2). With the proposed decommissioning of the Oyster Creek plant in 2019,² New Jersey must develop new generation units to make up for the loss in MWh generation. The state legislature recently passed a bill (S-2381) that would subsidize power suppliers to build up to 2,000 MW of new generating capacity in New Jersey. Natural gas-based gas

2. *New York Times*, "Oyster Creek Reactor to Close by 2019" (December 8, 2010). Available online at: <http://www.nytimes.com/2010/12/09/nyregion/09nuke.html>.

turbines and combined-cycle units are the next major source of power generation (nearly 32 percent). Low natural gas prices in recent times have contributed to the surge in electricity generation from these units. The traditional coal-based, steam-turbine units account for 14 percent of the power generation. Renewable resources like solar and wind accounted for less than 1 percent of electricity generation in 2008. With the adoption of Renewable Portfolio Standards (RPS), this share is expected to reach 22.5 percent by 2021.

New Jersey's energy policy encompasses both the regulated and the unregulated energy markets. The New Jersey Board of Public Utilities (BPU) regulates investor-owned utilities delivering electricity and gas to residents, businesses, and industries. But other energy types like petroleum products and propane are delivered through unregulated markets. Some of the key regulations and legislation concerning New Jersey's energy policy are summarized in table 1.

FIGURE 2
New Jersey Electricity Generation by Source (2008)



Notes: Total New Jersey in-state electricity generation for 2008 (the last year for which this data has been released) was 63,675 GWh. Numbers may not total to 100 percent due to rounding.

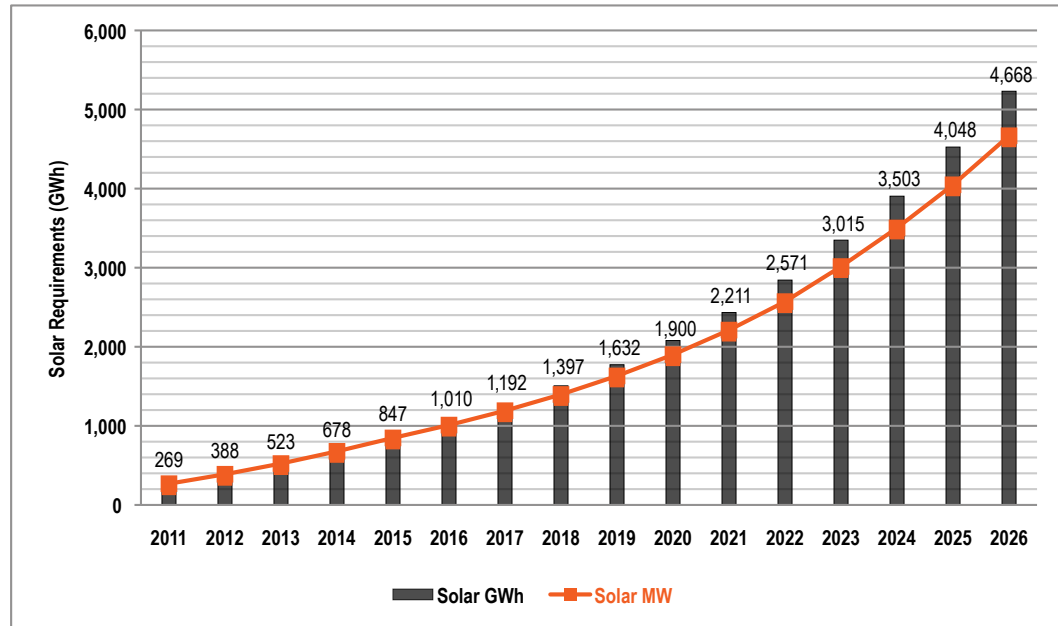
Source: U.S. Energy Information Administration, Form EIA-923.

TABLE 1
Summary of Key New Jersey Legislation/Regulations
Concerning the State’s Energy Policy

<i>Legislation/Regulation</i>	<i>Salient Features</i>
<p>New Jersey Energy Master Plan Statute (N.J.S.A. 52:27F-14) (Enacted 1977)</p>	<ul style="list-style-type: none"> • Calls for drafting a ten-year “master plan” for the “production, distribution and conservation of energy in New Jersey.” • Calls for the creation of a new Energy Master Plan (EMP) every ten years and an update to the EMP every three years. • The New Jersey Board of Public Utilities (BPU) is currently entrusted with the task of formulating the EMPs.
<p>Electric Discount and Energy Competition Act (N.J.S.A. 48:3-49 et seq.) (Enacted 1999)</p>	<ul style="list-style-type: none"> • Opened up the state utilities industry to competition and offered retail choices for end-users. • The BPU was entrusted to oversee the restructuring process and define standards for fair competition, supplier licensing, safety, and reliability. • Utilities were given the opportunity to recover stranded and transition costs from ratepayers.
<p>Renewable Energy and Efficiency Standards (N.J.A.C. 14:8-1.1 et seq.) (Enacted 2001)</p>	<ul style="list-style-type: none"> • New Jersey’s Renewables Portfolio Standard (RPS) requires each electricity supplier in the state to procure 22.5 percent of electricity from qualified renewable facilities by Energy Year 2025. • The standard classifies renewable energy as: “Class I” (includes solar, wind, tidal, geothermal, and sustainable biomass) and “Class II” (includes resource-recovery facilities outside the state). • Introduces a separate percentage-based Renewables Portfolio Standard for solar. • Introduces energy credits (Renewables Energy Credits [REC] and Solar REC [SREC]) as a compliance option.
<p>New Jersey Global Warming Response Act (A.B. 3301) (Enacted 2007)</p>	<ul style="list-style-type: none"> • Calls for reducing greenhouse gases to 1990 levels by 2020 (an approximate 20 percent reduction). • This would be followed by a further reduction of 80 percent below 2006 levels by 2050.
<p>Solar Energy Advancement and Fair Competition Act (A.B. 3520) (Enacted 2010)</p>	<ul style="list-style-type: none"> • Extends solar requirement till Energy Year 2026. • Establishes a 15-year Solar Alternative Compliance Payment schedule. • Directs BPU to formulate “net metering” standards for ease of interconnection. • Replaces the percentage-based solar carve-out requirements with MWh targets.
<p>Off-shore Wind Economic Development Act (S.B. 2036) (Enacted 2010)</p>	<ul style="list-style-type: none"> • Directs BPU to develop an offshore, wind-renewable energy certificate program to support at least 1,100 MW of off-shore-installed capacity.

FIGURE 3

New Jersey Solar GWh and Installed Capacity Projection



Note: The requirements are on an Energy-Year basis (June 1–May 31). The MW capacity is calculated assuming a capacity factor of 13 percent.

Source: U.S. Department of Energy. Database of State Incentives for Renewables & Efficiency (DSIRE™), New Jersey.

In 2003, the BPU established the Office of Clean Energy to administer New Jersey’s Clean Energy Program.³ NJCEP promotes statewide initiatives on improving energy efficiency and the increased use of clean, renewable sources of energy like solar, wind, and sustainable biomass. The administrative setup of NJCEP comprises a cross section of government and industry representatives, energy experts, public-interest groups, and academics.

New Jersey’s Renewables Portfolio Standard (RPS)—one of the most aggressive in the country—requires each electricity provider serving retail

customers in the state to procure 22.5 percent of electricity from qualified generators by 2021.⁴ Of this target, nearly 20 percent is expected from “Class I” renewable (solar, wind, sustainable biomass, and so on), and 2.5 percent is expected from “Class II” renewable. In addition, there is solar carve-out with MWh targets for solar power generation (figure 3). Within the Class I requirement, this solar carve-out has an ultimate goal of generating 5,316 GWh of electricity from solar facilities in 2026. This would translate into 4,700 MW of solar-installed capacity within the state by 2026.

3. New Jersey Clean Energy Program (NJCEP), 2011. Online at <http://www.njcleanenergy.com/>.

4. DSIRE™, U.S. Department of Energy. Database of State Incentives for Renewables & Efficiency, 2011. Online at <http://www.dsireusa.org/>. Accessed March 15, 2011.

New Jersey's solar financing program is founded on a combination of tax credits, electricity cost savings, net-metering benefits, solar renewable energy certificates sales, and rebates for small systems to reduce the installation cost. Of these, the Solar Renewable Energy Credits (SRECs) provide the major portion of revenue to the BPU to spur future investments in the solar-energy sector.⁵ An SREC represents the clean-energy attribute of solar generation, which is in addition to the tariff rate for quantity of electricity produced. One SREC is issued to the generator for every 1,000 kWh (or 1 MWh) of generation from qualified facilities. SRECs are then sold or traded separately from the electricity generated, thereby providing solar-system owners an additional stream of revenue to offset the investment cost.

Electricity suppliers, in turn, are required to purchase SRECs to meet the requirements of state-mandated RPS targets for every compliance year. The prices of SRECs are determined by market dynamics. SRECs currently trade at around \$600/MWh; as a point of comparison, other Class I RECs are trading below \$10/MWh. SRECs' prices are bounded by the Solar Alternative Compliance Payment (SACP), which is the maximum compliance amount the electricity suppliers pay if they do not meet the solar RPS requirements for the given year. The BPU determines the SACP. Under current provisions, the SACP is determined according to an eight-year schedule, although recent legislation has mandated the BPU to adopt a 15-year SACP schedule.



Large solar-panel installation on the Livingston Campus of Rutgers University in Piscataway, New Jersey.

© Rutgers, The State University of New Jersey. Courtesy of University Relations. Photo by Nick Romanenko.

Looking Ahead

New Jersey's aggressive renewable energy policy shows promising results, although questions about its costs are beginning to surface. By the end of 2010, New Jersey had the second-highest solar installation capacity in the country, exceeded only by California. From just over six installations in 2001, the state now has a total grid-interactive solar capacity of more than 300 MW from more than 8,000 projects.⁶ With increasing RPS targets and innovative financing options, the State of New Jersey is poised to play a leadership role in the country's renewable energy arena. ■

5. New Jersey Clean Energy. "New Jersey Approves SREC-based Financing" (December 17, 2007).

6. New Jersey Board of Public Utilities (BPU). "New Jersey Excels in Solar Market" (April 12, 2011).

ADVANCE & RUTGERS REPORT

The **Edward J. Bloustein School of Planning and Public Policy** is one of the nation's key centers for the theory and practice of planning and public policy scholarship and analysis. The school was established in 1992 by the Rutgers University Board of Governors to provide a focus for all of Rutgers' initiatives and programs of instruction, research, and service in planning and public policy.

A Bloustein School Twentieth Anniversary Celebration

March 2012 will mark the twentieth anniversary of the establishment of the Edward J. Bloustein School of Planning and Public Policy. A series of events from fall 2011 through spring 2012 is planned to commemorate this achievement. Festivities will include presentations on Bloustein School faculty and staff research, several major lectures, and a two-day symposium on healthy cities, health policy, transportation security, and international planning. Events will highlight the best of the school's work in urban planning, public policy, and public health. They will begin in September 2011 with the construction of the Rutgers and NJIT completely solar-powered ENJOY house on the Washington Mall in the District of Columbia as part of the U.S. Department of Energy's Solar Decathlon, and culminate in the two-day symposium.

For additional information about the Bloustein School, its academic programs, upcoming events, and affiliated research centers, visit the school's website: <http://www.policy.rutgers.edu>. Check the website frequently for calendar updates on special Twentieth Anniversary events. ■

Advance Realty, an owner and developer of office, flex, industrial, retail and multifamily properties, has grown to become one of the most active and respected commercial real estate development, investment and management companies in the New Jersey and Washington, D.C. markets. This philosophy is evidenced by Advance's active presence in the commercial real estate trade, business and non-profit sectors, where members of the Advance team have consistently played a leadership role in serving the industry's associations including ULI, BOMA, NAIOP, and CoreNet Global, as well as numerous charitable organizations. For additional information about Advance Realty, visit <http://www.advancerealtygroup.com>. ■

The *Advance & Rutgers Report* published its inaugural issue in the fall of 2009.

- Issue Paper 4** **The Great Uncertainty**
(December 2010)
- Issue Paper 3** **Post-Recession America: A New Economic Geography?**
(July 2010)
- Issue Paper 2** **Y2K+10: A New Decade Unfolds**
(February 2010)
- Issue Paper 1** **America's New Post-Recession Employment Arithmetic**
(September 2009)

The *Advance & Rutgers Report* is available for download on the Bloustein School's website:

<http://www.policy.rutgers.edu/reports/arr/>

and on the Advance Realty website:

<http://www.advancerealtygroup.com>

Previous issues of the former *Rutgers Regional Report* include:

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- Report 26** **Where Have All the Dollars Gone?
An Analysis of New Jersey Migration Patterns**
(October 2007)
- Report 25** **New Jersey's New Economy Growth Challenges**
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- Report 24** **Anatomy of a Recovery: A New Jersey Report Card**
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