Energy Use and Renewable Energy Sources

Background

Naturally, our quality of life and economy depend on the availability of large amounts of energy, most of which comes from the combustion of fossil fuels. Fossil fuels include coal, natural gas, and a variety of liquid fuels, such as gasoline, diesel fuel, and heating oil, that are derived from petroleum: we use considerable amounts of gasoline and diesel fuel for transportation; we use heating oil and natural gas for heating our buildings; and we use fossil fuel generated electricity in a variety of ways, including manufacturing, heating and cooling, lighting, and in communications, although in New Jersey, over half of the electricity generated comes from combustion-free nuclear.

According to the Energy Information Administration (EIA), the world's total energy consumption in 2008 was 505 quadrillion British Thermal Units (BTUs), with 85% derived from fossil fuels. By 2035, the world's energy consumption is projected to be 770 quadrillion BTU, an increase of 53% from 2008.[1] Fossil fuels are not renewable, which supports the view that at some point they will become increasingly costly as they are depleted[2] and the resulting scarcity will present challenges to national energy security. Further, combustion releases air pollutants: ozone precursors, such as nitrogen oxides (NO_x) and volatile organic compounds (VOCs); acid rain precursors, including NO_x and sulfur dioxide (SO_2); various toxics, such as mercury; and carbon dioxide, a major greenhouse gas (GHG). Extraction, transport, refining and use of fossil fuels are associated with: environmental impacts to the earth's surface (e.g., strip mines, oil spills and storage tank leaks); pollution of aquatic systems (e.g., acid mine drainage and thermal pollution of rivers); and, the consumption of large amounts of land and other resources for electricity transmission lines, oil and gas pipelines, road and rail transport of fuels, and fuels storage.

Unlike fossil fuel combustion, renewable energy sources provide energy without depleting fossil fuel reserves and with lower overall environmental impacts. Renewable energy sources are described as naturally replenishing, and restore themselves over short periods of time. They are inexhaustible in duration on human-time scales, but limited in the amount of energy that is available per unit time. Such sources include hydropower, wave or tidal, geothermal, solar, wind and biomass. Although biomass fuel sources release carbon dioxide when burned, generally they are not considered net releasers because they also remove carbon from the atmosphere during their growth cycle.[3] Increasing the development of renewable energy sources reduces our reliance on fossil fuels, provides energy security, creates new economic opportunities, and improves environmental conditions.

Solar photovoltaic (PV) is a type of renewable technology that converts sunlight directly into electricity. Applications of PV are flexible, ranging from utility-scale solar farms to residential rooftop projects. It is a technology that has seen tremendous growth over the past few years despite the average solar radiation that falls on New Jersey, relative to other states such as California and Arizona. In 2008, 835 projects were completed, representing 22.7 megawatts (MW) of added solar capacity; while in 2010, 3,139 PV projects were completed, representing 132.3 MW of added capacity, for a cumulative total of 260 MW.[4] The recent increase of solar energy in New Jersey is driven by: a strong Renewable Portfolio Standard (RPS), with a solar electric set aside; interconnection and net metering standards set by the Board of Public Utilities (BPU) that have made it easier for systems to connect to the distribution system; federal grants and tax credits; and a Solar Renewable Energy Certificate (SREC) financing model that provides energy credits. New Jersey's net-metering standards specifically have helped customers maximize their renewable energy investments. Net-metering enables customers to obtain full retail credits on their utility bill for each kWh of electricity used that their system produced.

An SREC represents the clean energy benefits of electricity generated from a

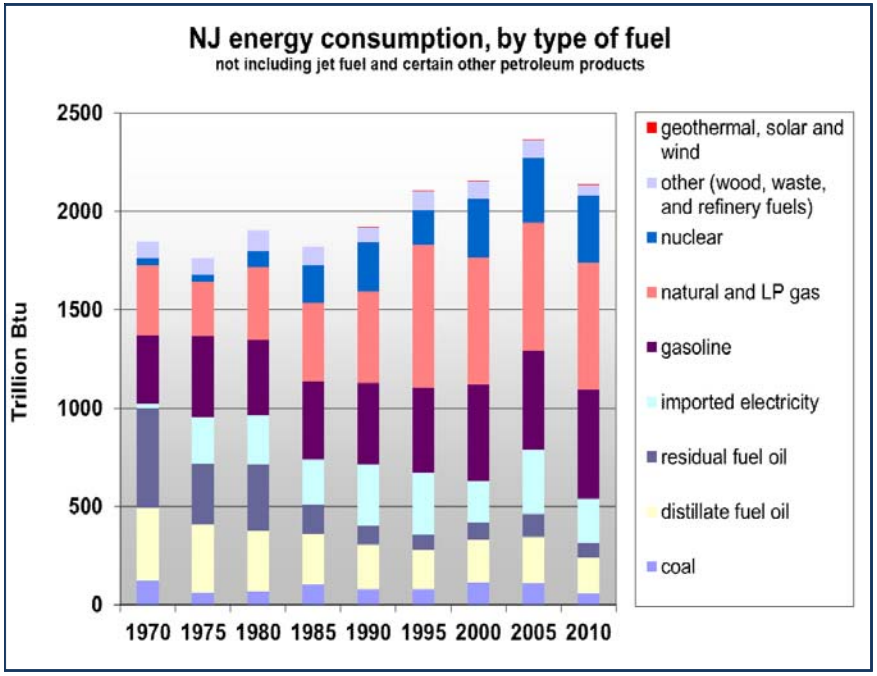
solar electric system with one SREC issued for each 1,000 kilowatt-hour (kWh) generated. SRECs are then sold or traded, separately from the sale of power, providing solar system owners with a sourceof revenue to offset the cost of installation and, in most cases, provides additional revenue for the owner/lessor of the system. Electricity suppliers in New Jersey must meet solar RPS requirements through purchase of SREC's or pay a Solar Alternative Compliance Payment (SACP). By 2028, the solar RPS requires suppliers/providers serving retail customers to procure at least 4.1% of the electricity it sells from solar electric power generators in the State.[5]

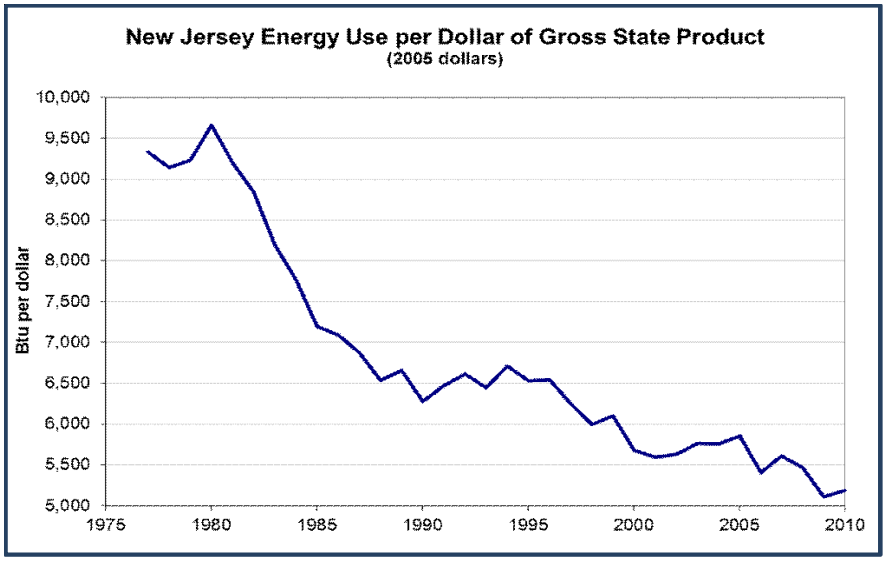
Another fast-growing and promising renewable source of energy in the U.S. is onshore wind power. New wind-power sources are generally competitive in cost with new, conventional electricity-generating plants when sited in areas with a good wind resource. The first commercial scale onshore wind farm was constructed in Atlantic City and has been operational since 2005. Additional wind power projects are planned in other areas of the state.

With respect to offshore wind, a study coordinated by the NJ Commerce Commission to examine potential economic impacts of constructing up to 288 megawatts (MW) of wind power capacity off the New Jersey shore was released in September, 2008.[6] A baseline study coordinated by DEP to determine the current distribution and usage of New Jersey's offshore waters by ecological resources was completed in 2010 and used to help delineate a Wind Energy Area (WEA), which is eligible to foster leasing and offshore wind development.[7] In August 2010, Governor Christie signed the Offshore Wind Economic Development Act (OWEDA) that called for at least 1,100 MW of offshore wind capacity built off New Jersey's coast. OWEDA establishes an Offshore Renewable Energy Certificate (OREC) program to help jump start offshore wind projects. This certificate program differs from the SREC program in that pricing is established by each Offshore Wind Developer as part of its application process and must be individually evaluated and approved by BPU based upon factors identified in OWEDA. Currently, there are no offshore wind plants constructed in the U.S.[8]

Status and Trends: Temperature

Total energy use has grown in New Jersey and the United States for the last several decades.[9] (See figure "NJ energy consumption, by type of fuel") There also has been a trend of increased energy efficiency over time as well as a





current drop in demand due in part to economic factors. (See figure "New Jersey Energy Use per Dollar of Gross State Product.")

There have been changes in the mix of energy sources used, including a decline in the use of residual fuel oil and an increase in the use of nuclear power and gasoline. (See figure "NJ energy consumption, by type of fuel").

Combustion of fossil fuels for energy purposes releases carbon dioxide, a GHG which has a warming effect on the earth's climate. (Such combustion also releases gases such as NO_x that facilitate the production in the lower atmosphere of ozone, which is itself a short-lived regional GHG. Short-lived regional GHGs, such as tropospheric ozone and black carbon, contribute to both warming and degraded air quality and are important considerations for climate change mitigation, the improvement of public health and food security.[10]) Globally, carbon dioxide is increasing steadily in the atmosphere, as are several other greenhouse gases. GHGs generated by human activities already have altered the earth's climate, and are likely to contribute to warming in the future.[11] Impacts from this warming, and associated climate changes, could be irreversible – (see the separate report, Climate Change, in this Environmental Trends series).

New Jersey has adopted the Global Warming Response Act, which establishes a limit for 2020 emissions equal to 1990 levels and a limit for 2050 emissions of 80% below the 2006 level.[12]

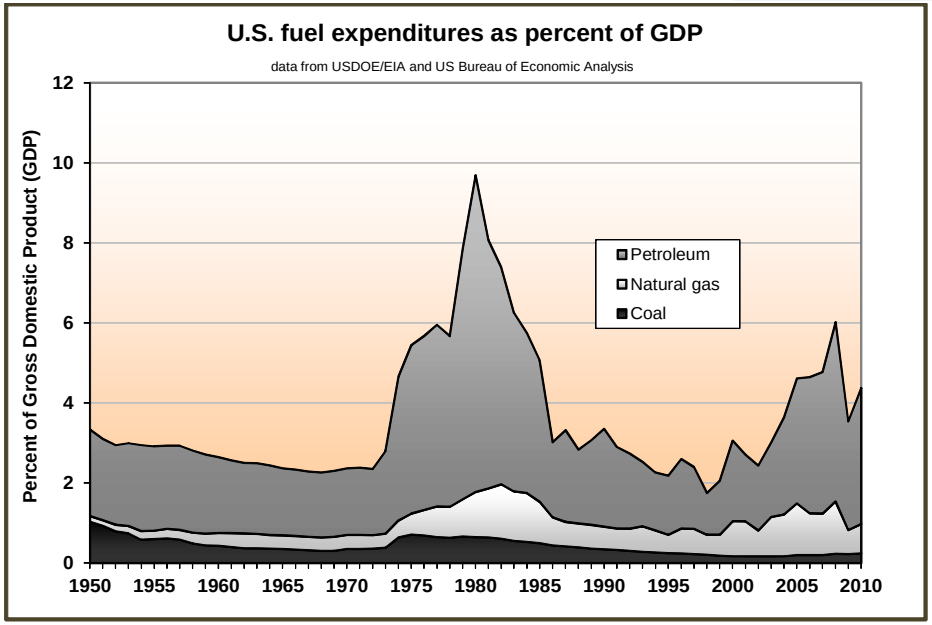
As discussed in the Department's report, Meeting New Jersey's 2020 Greenhouse Gas Limit: New Jersey's Global Warming Response Act Recommendations,[13] much of the reduction necessary to meet the 2020 limit is expected to be accomplished through the implementation of New Jersey's Energy Master Plan (EMP). A revised EMP was released December 6, 2011 and is available on line.[14]

Other actions are expected to contribute to achievement of the 2020 limit, such as steps taken to lower emissions from motor vehicles. In January 2006, the DEP adopted rules to implement a Low Emission Vehicle (LEV) Program, which was based on standards adopted by California. On April 1, 2010, the U.S. Environmental Protection Agency and the U.S. Department of Transportation jointly adopted federal motor vehicle GHG emission standards and related fuel economy standards for passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. These new rules require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon (MPG) if the automobile industry chooses to meet this carbon dioxide level solely through fuel economy improvements. The State will continue to monitor the impact of the federal program on the State's assumptions relative to greenhouse gas reductions from new motor vehicle initiatives.

Continued dependency on fossil fuels also means facing the risk of dramatically increasing energy costs if fossil fuel production fails to keep pace with the steadily growing demand for energy - or if production actually decreases, as some predict.[15,16,17,18,19]

Prices of petroleum have risen dramatically in recent years, and the increases have not, so far, stimulated a noticeable increase in production. Between 1986 and 2000, petroleum production increased on average 1.41% per year with the average spot price[20] rising 5.15% per year. However, during the period between 2000 and 2011, petroleum production increased on average only 0.72% per year, or about half of the "normal" growth based on the 1986 to 2000 pattern, and the average spot price has approximately doubled during this same period.[21] The rising cost of petroleum and to a lesser extent other fossil fuels has led to a recent increase in the percentage of the U.S. gross domestic product that is consumed by expenditures on fuel. It is likely that this increasing percentage has already had economic ramifications, and further increases in this percentage may significantly impact the economy (See the figure "U.S. Fuel Expenditures as percent of GDP"). New Jersey produces no fossil fuels; the state is totally dependent on imports.

It is important to note that with the recent advent and continuing improvement of advanced crude oil and natural gas production technologies, EIA projects domestic supply will increase through 2019, essentially reversing the trend of flat or declining production.[22] The growth in crude oil results largely from a significant increase in onshore crude oil production, particularly from shale and other tight formations. Increases in domestic natural gas and crude oil production, largely from the growing shale production, is projected to outpace domestic consumption and spur net exports by 2020.



Solutions to the twin problems of rising greenhouse gas emissions and accelerating energy costs can be found in increased energy efficiency and conservation,[23] and in the replacement of fossil fuel energy with renewable sources. Primarily because it is not blessed with abundant hydropower or geothermal energy, New Jersey receives a smaller percentage of its energy from renewable sources than the U.S. average. Nationally, three categories of renewable energy, geothermal, wind power, and solar power, supplied about 1,257 trillion BTU per year in 2010, which represented about 1.3 percent of the U.S. total energy consumption of about 98 quadrillion BTU/year. In the U.S., onshore wind power capacity is expanding rapidly, adding about 660 trillion BTU of capacity between 2006 and 2010. In New Jersey, these three renewable source categories supplied in 2010 about 3.9 trillion BTU/year,[24] which represented 0.16 percent of the state's approximately 2,447 trillion BTU[25] total energy consumption. Of the 3.9 trillion BTU/year in 2010, 0.5 trillion BTU is estimated to come from geothermal and 3.4 trillion BTU from solar sources. New Jersey's recent rate of growth in solar energy is higher than the U.S. as a whole. The State increased its solar capacity from 3.8 MW in 2004 to 260 MW in 2010, an increase of 6,742%.[26] During this same period, U.S. solar increased it solar capacity by 157%.[27] New Jersey is third only to California and Arizona in the total amount of installed solar PV capacity.[28]

Outlook and Implications

The 2011 Energy Master Plan (EMP) supports the development of cost-effective renewable resources and accelerating the RPS solar requirement. On June 23, 2012, Governor Christie signed the Solar Act, which among other things, accelerates the solar RPS and gives the State more oversight over solar development. As noted above, the RPS calls for 4.1% of the State's electricity to be generated from in-state solar electric power by 2028. Recent solar trends and the oversupply of SRECs in the market make the solar RPS a realistic goal. Offshore wind development represents opportunity for the State to take advantage of a rare indigenous energy resource, similar to the opportunities afforded by solar. OWEDA calls for at least 1,100 MW of offshore wind development and has provided a financial mechanism that balances the costs with benefits. The BPU is working with the Bureau of Ocean Energy Management on a Proposed Sale Notice for federal lease auctions, which will allow offshore wind development in federal waters.

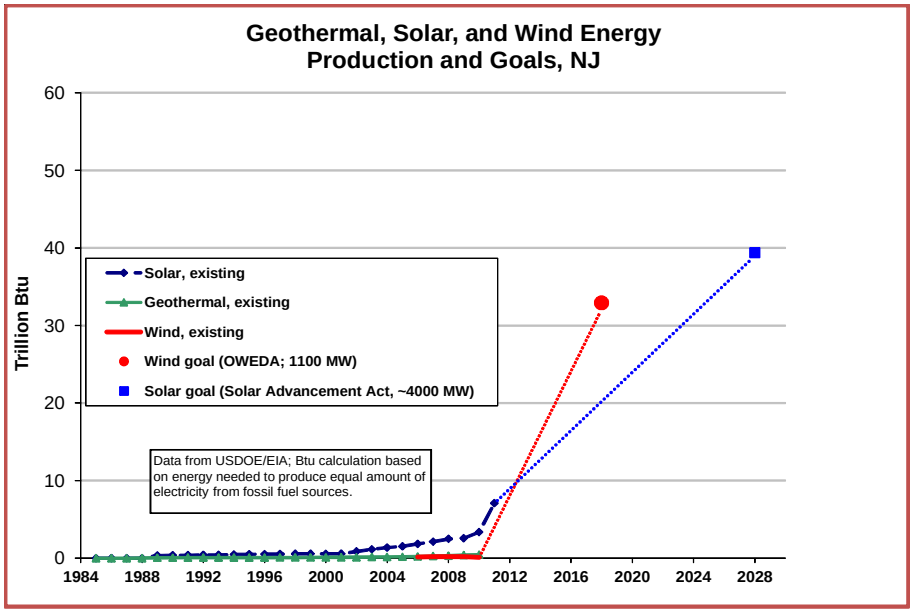
If solar PV supplies 4.1% by 2028, and if 1,100 MW of wind capacity (which would supply about 3000 GWh)[29] is on line by then, these power sources would offset approximately 69 trillion BTU[30] from fossil fuels that would be necessary to produce the same amount of electricity. This represents approximately 3.2 percent of the total amount of energy consumed in the State. See the chart, "Geothermal, Solar, and Wind Energy Production and Goals, NJ."

Combustion of waste, much of which is paper or other biogenic material, and wood currently provides approximately 20 trillion BTU/year in NJ. About 3 trillion BTU/year of this total is landfill gas burned in generators, which is estimated to provide about 0.1% of the State's total electricity.[31] Increased use of these and other biofuels has the potential to add to the renewable source percentage.

The current rate of growth of renewable power capacity in New Jersey is not high enough to eliminate continued dependence on fossil fuels in the near future. In the event that renewable energy penetrates to levels as seen by fossil fuels today, there will be an added need for flexible, load balancing

generation to smooth out the variability and intermittency associated with most renewable technology. Grid operators must balance supply with demand instantaneously, and adding resources that do not have the ability to control output ("nondispatchable resources") make reliability more difficult. The EMP acknowledges this in its advocacy of a balanced approach of energy efficiency, renewable energy, and cleaner, flexible conventional sources; e.g., new combined cycle natural gas plants that complement renewable resources.

Unless New Jersey can greatly increase the pace of introduction of renewable energy or emission-free nuclear sources, or make large improvements in energy efficiency and conservation, or both, the state will remain largely



dependent on fossil fuels, which as noted above, may become significantly more expensive and it will be difficult for the State to reduce its GHG emissions to the degree called for by the GWRA.

It is important to emphasize that approximately 50% of the electricity generated in New Jersey is produced by emission-free nuclear power. In 2019, the Oyster Creek nuclear power plant plans to retire and, notwithstanding significant development of in-state renewables over the next eight years, additional fossil fuel generation will need to be dispatched in order to compensate for the loss of the base load nuclear generation. Expanding this source significantly soon, however, is not likely as it will require federal action and steps at the national level to solve the problems that have so far hampered further development of nuclear power in the U.S. For this reason, NJ must continue its "balanced portfolio" policy, as expressed in the EMP, while continuing its efforts to develop emission-free technologies.

New Jersey has a number of initiatives that reduce reliance on fossil fuels and promote cleaner energy, energy conservation and renewable energy. These initiatives include the following:

♦ New Jersey Energy Master Plan (EMP) is required by N.J.S.A. 52:27F-14. After an intensive public participation and stakeholder process, New Jersey's Governor Christie released an update to the 2008 EMP in December, 2011.[32] The EMP includes a list of recommended policies and measures to increase in-State energy projection, improve grid reliability, and recognize the significant economic and environmental benefits of energy efficiency, conservation, renewable and nuclear energy sources.

♦ The GWRA, as noted above, calls for reducing GHG emissions to 1990 levels by 2020, approximately a 20 percent reduction from current levels, followed by a further reduction of emissions to 80 percent below 2006 levels by 2050. The GWRA also calls for recommendations from DEP as to how reductions can be achieved. Recommendations, which rely on energy conservation and renewable energy goals of the EMP, but also include proposed transportation, land use, and other actions, were released December 2009.[33] While the EMP was not intended as a plan to meet the GWRA goals, it provides the proper direction to do so through 2020, but understandably recognizes the difficulties of achieving further directions with current technologies.

♦ In 1999, the New Jersey Electric Discount and Energy Competition Act became law. This gives utility customers the opportunity to choose their electricity suppliers. As a result, energy companies that provide electricity

from renewable sources have entered the New Jersey market and are offering consumers green energy choices.

♦ The NJ Clean Energy Program[34] has been operating since 2003. This is a ratepayer-funded program that encourages installation of energy-efficient and renewable electricity generation technologies, such as photovoltaic units on rooftops. It was estimated that the 2011 energy efficiency programs, including both actual and committed actions, will produce a total over 8.5 million megawatt hours of electricity lifetime savings and over 26 million therms of natural gas lifetime savings. The program has also helped to install 955 MW of solar capacity in New Jersey through 2012. The program estimated that the annual CO2 emission reductions achieved from all its actions as of the end of 2011 were approximately 0.7 million metric tons.[35]

♦ The NJ Board of Public Utilities (BPU) has adopted a Renewable Portfolio Standard (RPS) requiring that utilities meet 8.4% of customers' electricity needs from class I and II renewable energy sources by May 31, 2012.[36] The RPS requires that 20.38% of New Jersey's electricity must come from renewable sources by 2020, and an additional 3.47% must be provided by in-State solar energy. The State is currently on track to meet these targets.

♦ Governor Christie signed the Energy Savings Improvement Program Act ("ESIP") on September 21, 2012 and allows government agencies to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. The ESIP provides all government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources.

♦ Governor Christie signed the Solar Act on June 12, 2012 which, among other things, accelerates the solar renewable portfolio standard and gives the State greater oversight over solar development, including incentives aimed at brownfield, landfill, and historic fill.

♦ Governor Christie signed the Offshore Wind Economic Development Act on August 19, 2010, that will establish an offshore wind renewable energy certificate program (OREC) and will make available financial assistance and tax credits from existing programs for businesses that construct manufacturing, assemblage and water access facilities to support the development of qualified offshore wind projects.

♦ DEP, through its Sustainability and Green Energy Office, has worked in cooperation with the New Jersey Department of Community Affairs (NJDCA) and the New Jersey Clean Cities Coalition to address concerns identified by plug-in electric vehicle manufacturers that the time, cost and potential delays in local permitting for residential charging equipment could be a significant obstacle for plug-in electric vehicle buyers. As a result, the NJDCA has determined that a streamlined permitting process can be used for the installation of a residential plug-in electric vehicle charging station.

♦ In January, 2006, New Jersey adopted a Low Emission Vehicle (LEV) program modeled after California's LEV Program.[37] The program contains three components: vehicle emission standards, fleet-wide emission requirements, and a Zero Emission Vehicle (ZEV) sales requirement. The adoption of the LEV program ensures that vehicles designed to incrementally produce fewer and fewer GHG emissions over time will be available for purchase in New Jersey. On May 19, 2009, President Obama announced a national policy initiative directing the U.S. Environmental Protection Agency and the U.S. Department of Transportation to propose federal motor vehicle GHG emission standards and related fuel economy standards. On April 1, 2010, the U.S. Environmental Protection Agency and the U.S. Department of Transportation jointly adopted federal motor vehicle GHG emission standards and related fuel economy standards for passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016.[38] On August 28, 2012, the U.S. Environmental Protection Agency and the U.S. Department of Transportation issued a joint Final Rulemaking to extend the National Program of harmonized greenhouse gas and fuel economy standards to model year 2017 through 2025 passenger vehicles.[39] In March 2013, the U.S. Environmental Protection Agency announced they are issuing a proposed rule designed to reduce air pollution from passenger cars and trucks. Starting in 2017, Tier 3 would set new vehicle emissions standards and lower the sulfur content of gasoline, considering the vehicle and its fuel as an integrated system. The Tier 3 proposal is harmonized with the California Air Resources Board (CARB) Low Emission Vehicle (LEV III) program so automakers could sell the same vehicles in all 50 states. This proposal does not impact the zero emission vehicle program adopted by certain states, including New Jersey.

More Information

The Department, through its Office of Sustainability and Green Energy and Office of Science, as well as other programs, continues to work to implement New Jersey's GWRA, and continues to work with the BPU to expand clean energy, energy efficiency, and renewable energy in the State. More information on the Energy Master Plan and other BPU initiatives is available at http://www.nj.gov/emp . More information on GHG reduction and related efforts is available at http://www.nj.gov/dep/sage/climate-energy.html

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report, U.S. Energy Information Administration, 2010.

[2] Smil, Vaclav, 2003, Energy at the Crossroads: Global Perspectives and Uncertainties, MIT Press, Cambridge, MA

[3] However, the degree to which biomass fuels release no net carbon dioxide depends on the percentage of the carbon they contain that is from plants, and on the amount of fossil fuels used in the production, harvesting, and transport of these plant-derived materials. Ethanol, for example, is produced from corn or sugar cane, but these crops as currently grown require large inputs of fossil fuels such as diesel fuel for tractors and chemicals such as pesticides derived from petroleum.

[4] New Jersey Clean Energy Program, Solar installation projects; available at http://www.njcleanenergy.com/renewable-energy/project-activity-reports/installation-summary-by-technology/solar-installation-projects

[5] Revisions to the Solar Energy Advancement and Fair Competition Act was passed by the legislature (S1925) and signed into law (P.L. 2012, c.2424) on July 23, 2012; final draft available at http://www.njleg.state.nj.us/2012/Bills/PL12/24_.PDF

[6] Global Insight, 2008, *An Assessment of the Potential Costs and Benefits of Offshore Wind Turbines*, prepared for State of New Jersey by Global Insight, Eddystone, PA and Lexington, MA, September, 2008, http://www.state.nj.us/bpu/pdf/announcements/njoswt.pdf

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[11] Intergovernmental Panel on Climate Change (IPCC), 2007, Climate Change 2007: Synthesis Report, Summary for Policymakers. Fourth Assessment Report. November 2007.

[12] P.L. 2007, c.112

[13] http://www.nj.gov/globalwarming/home/gwra_report.html

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[15] Goodstein, David, 2004, Out of Gas: The End of the Age of Oil, W.W. Norton, NY

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[18] Deffeyes, Kenneth, 2005, Beyond Oil: The View from Hubbert's Peak, Hill and Wang

[19] Simmons, Matthew, 2005, Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy, Wiley

[20] Spot prices refer to the price for near term delivery of a specific quantity of a product at a specific location where the commodity is purchased at current market rates.

[21] U.S. Department of Energy, Energy Information Administration, last accessed April 2013, http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=5&pid=57&aid=1&cid=regions&syid=2007&eyid=2011&unit=TBPD and http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RWTC&f=A

[22] U.S. Department of Energy, Energy Information Administration, Annual Energy Outlook 2013, http://www.eia.gov/forecasts/aeo/

[23] In this context, "energy efficiency" means the accomplishment of more work with the same amount of energy, and "energy conservation" means the use of less energy, which is not necessarily the result of increased efficiency. For example, a person could use less gasoline by driving a new car that got better mileage, or a person could use gasoline by driving the existing car fewer miles.

[24] USDOE/EIA (EIA), 2009, State Energy Data System, http://www.eia.doe.gov/emeu/states/state.html?q_state_a=nj&q_state=NEW%20JERSEY . These data are derived from responses by manufacturers to EIA surveys that indicate destinations of renewable energy equipment and from KWh produced from wind as reported to EIA. In the case of solar PV and wind, power produced is converted by EIA to Btu based on the U.S. average rate of Btu consumed in electricity production; it thus represents the energy that would have been consumed had this amount of electricity been produced through fossil fuel combustion.

[25] This value does not include jet fuel sold in NJ, and certain petroleum fractions that are not combusted but are instead used as feedstocks for plastics, road paving, etc.

[26] BPU, www.njcleanenergy.com, solar installation summary, last accessed 2/19/2013

[27] This value was estimated using EIA's Annual Energy Review Table 1.2 Primary Energy Production by Source, 1949-2011 and Table A6 Approximate Heat Rates for Electricity, and Heat Content of Electricity, 1949-2011.

[28] Solar Energy Industries Association, 2012, 2012Year In Review

[29] The five wind generators near Atlantic City have a combined total capacity of 7.5 MW. In 2007, based on EIA data (http://www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/table5.html), they supplied 20,412 KWh, which represents approximately 31% of total capacity.

[30] 1100 MW of offshore wind capacity operating at 31% utilization would produce about 3 million MWh/year, which, using EIA's conversion factor of 9756 Btu/Kwh, would represent the consumption of approximately 29 trillion Btu had this electricity been produced by the combustion of fossil fuels.

[31] EIA, 2010, Survey Form EIA-923 year 2010, http://www.eia.gov/electricity/data/eia923/index.html. This survey form collects detailed electric power data — monthly and annually — on electricity generation, fuel consumption, fossil fuel stocks, and receipts at the power plant and prime mover level.

[32] BPU, 2011, 2011 New Jersey Energy Master Plan (EMP), http://nj.gov/emp/docs/pdf/2011_Final_Energy_Master_Plan.pdf

[33] http://www.nj.gov/dep/sage/docs/njgrwa_final_report_dec2009.pdf

[34] http://www.njcleanenergy.com/

[35] http://www.njcleanenergy.com/main/about-njcep/about-njcep

[36] Class I renewables are solar, wind, fuel cells powered by renewable fuels, geothermal, wave or tidal, and sustainable biomass

[37] 38 N.J.R. 497(b), (January 17, 2006)

[38] "Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule," 75 Federal Register 88 (7 May 2010), pp. 25324- 25728.

[39] "2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards," 77 Federal Register 199 (15 October 2012), pp. 62623-63200.