A Sustainable Energy Future for Delaware

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On behalf of the
Sustainable Energy Utility Task Force
Created by the Delaware General Assembly
http://www.seu-de.org/

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KEY FINDINGS OF THE DELAWARE SUSTAINABLE ENERGY UTILITY TASK FORCE

- Energy efficiency, conservation and customer-sited renewables are the *proven best insurance policy against price volatility*. One national study (cited below) estimates a 7% reduction in electricity prices and a reduction of natural gas prices to 1999 levels if currently cost-effective energy efficiency technologies are fully deployed by 2020 (cited below).

- Energy efficiency, conservation and customer-sited renewables lead to peak demand reduction, which:
  - Achieves price stability
  - Actually lowers energy prices
  - Reduces energy bills, with immediate impacts.

  The SEU has estimated a *peak load reduction of more than 400 MW* from its program (see http://depsc.delaware.gov/electric/dplirp/mcdowell2006.pdf at p. 6). This reduction is larger than the amount of energy proposed for sale to Delaware by 20-25 year contracts from 'clean coal' and offshore wind technologies.

- Energy efficiency, conservation and customer-sited renewables create long-term, high-quality jobs. One estimate by a national partnership of labor unions and environmental organizations estimates that Delaware would realize *over 9,000 new permanent jobs from an aggressive policy of energy efficiency promotion* (cited below).

- Energy efficiency and conservation provide the *cheapest and cleanest energy service* we can possibly use even when it is raining and when the wind is not blowing.

- Better than all other options, energy efficiency, conservation and customer-sited renewables *cut* emissions that harm human health because these 3 tools *reduce the use of existing energy facilities*. The cleanest new utility-scale power plant cannot match this benefit; new utility plants can only slow down the rate of release of future, health-harming pollution.

- Well documented policies and programs in six pioneering states investigated by the Task Force proves that *Delaware can reduce the energy intensity of its residential building sector by more than 50%, and its commercial building sector by 40%* (see below).

- Energy efficiency, conservation and customer-sited renewables lead to *real* and *immediate* CO_2 savings. New utility-scale generation of any kind can only displace *future* CO_2 emissions. Risk management to address regulation of carbon must take into account this difference. The Task Force proposal results in the State's emissions in 2020 returning to year 2003 levels, a *real reduction of 5.5 million metric tons* (see below). We know of no proposal in Delaware that will *cut* emissions to this extent.

- The SEU approach promotes *technology innovation*. In a field where revolutionary change in technology is necessary, the SEU model enables the citizens and businesses of Delaware to take advantage of these opportunities, rather than locking them into 20-25 year contracts for energy from central station technologies that are in decline in the U.S. and abroad (see below).

On March 28, 2007, by unanimous vote of the attending Members of the Sustainable Energy Utility Task Force,[1] the final report for the first phase of the Task Force's work was adopted. Additionally, by unanimous vote of the attending Members, a comprehensive package of legislation was adopted for action in this session of the General Assembly. It includes:

- Legislation creating the Delaware Sustainable Energy Utility to serve the sustainable energy needs of *all energy consumers using all fuels*. It is not restricted to electricity or other utility markets. The SEU's charter will be based on three major goals:
    - Provide market development for residential and business purchases of high-efficiency alternatives in energy-using equipment to enable 30% savings in household and company energy use, with 33% of Delawareans participating by 2015 – these estimated savings will cut annual household energy costs by $1,000
    - Provide expanded weatherization services to residences, with a focus on the needs of low- and moderate-income families, doubling the number of annually weatherized units by 2015
    - Promote at least 300 MW of customer-sited renewable energy applications.

- Second, upgrade Delaware's Renewable Portfolio Standard to "best practice," using New Jersey as the State's benchmark. This would require an increase in renewable energy purchases by the State's electric utilities from 10% to 20% by 2019. Two percentage points of the new target will be reserved for solar photovoltaics. The Solar Carveout will provide a significant boost to PV technology, with the potential to increase investment in local PV manufacturing capacity.

- Third, increase the Green Energy Fund mill rate to $0.000356 per kilowatt-hour. Currently, Delaware has the second lowest wires charge for incentivizing renewable energy, energy efficiency and low-income energy weatherization[2] among the 23 states that have enacted such charges. By increasing the mill rate, the average residential customer would see an increase of 18 cents to the typical monthly electric bill.

- Fourth, update Delaware's Net Metering Law to encourage larger scale customer-sited renewable energy applications that contribute to long-term development of sustainable energy supply. Delaware's current policy limits customer-sited installations to 25 kW. In many cases, this limitation makes it unattractive for larger commercial customers to install PV or other customer-sited renewable energy systems.

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[1] Members are: Senator Harris B. McDowell, III, Chair; Dr. John Byrne, Co-Chair (Director, Center for Energy & Environmental Policy, University of Delaware); Senator Patricia Blevins; Senator Charles Copeland; Senator Gary Simpson; Representative Bethany Hall-Long; Representative Vincent Lofink; Representative Teresa Schooley; Representative Pamela Thornburg; Mr. Arthur Padmore, Public Advocate; Mr. Charlie Smisson, State Energy Coordinator; Mr. Keith Lake, Executive Director, Peoples Settlement Association; Ms. Dominique Baron, Environmental Advocate, Delaware Nature Society; and Mr. Andrew Slater, Delaware State Senate Office. Mr. Ralph Nigro (Vice President, Applied Energy Group, Inc. and Policy Fellow, CEEP, University of Delaware) serves as Task Force Technical Consultant. The following members of CEEP, University of Delaware serve as Research Staff: Mr. Jason Houck, Ms. Rebecca Walker, Mr. Jackson Schreiber, Mr. Lado Kurdgelashvili, Dr. Aiming Zhou, Mr. Huei Wong, Mr. Eric Partyka, and Mr. Ryan Harry.

[2] Delaware has one of the best-performing weatherization programs in the country. But it is underutilized due to inadequate funding. See http://ceep.udel.edu/energy/publications/2006_es_weatherization%20program_evaluation_Delaware.pdf

The SEU accomplishes its ambitious goals for Delaware with *no new taxes* and *no ratepayer bill impacts* (beyond an 18 cent increase in average monthly bills due to an increase in the Green Energy Fund mill rate).
Working capital for the SEU will be provided by "special purpose," tax-exempt bonds in an amount not to exceed $30 million during the initial years of its operation. The bonds will *not* add to the State's General Obligation Bonding.[3]

The Sustainable Energy Bond series will create the means to invest in sustainable energy technologies and measures on behalf of Delaware's residences and small-to-medium-scale businesses. The SEU will provide investments to voluntary participants. There are no mandates to join the SEU; people and businesses *choose* whether and to what extent they will become involved. For those who choose to join, the SEU will invest in their energy needs at a rate equal to the *full incremental cost* of purchasing cost-effective high-efficiency and customer-sited renewables options[4] compared to current market prices. In this way, SEU participants will find *no economic difference* between the purchase of energy efficiency, energy conservation and distributed renewable energy and conventionally available energy services and equipment.

5 BENEFITS OF THE SEU MODEL

1. The SEU is Delaware's Best Carbon Reduction Strategy

The Task Force estimates that the State's Carbon Footprint will be reduced dramatically by SEU-sponsored investments in energy efficiency and customer-sited renewables. The SEU will create real, measurable, and verifiable CO_2 savings from its first year of operation. With only one-third of Delaware households and businesses assumed to participate in SEU programs by 2015,[5] the SEU can save Delaware *5.5 million metric tons of CO_2 emissions by 2020*, or 33% of the State's current carbon footprint.

Strategies that build cleaner energy facilities to meet future demand growth can only slow, delay or even flatten future CO_2 releases. The SEU *cuts* carbon emissions by lowering the utilization of or eliminating altogether the need for current, as well as future, energy supply facilities.

The impact on the State's carbon footprint is far greater than any other State policy proposal of which we are aware.

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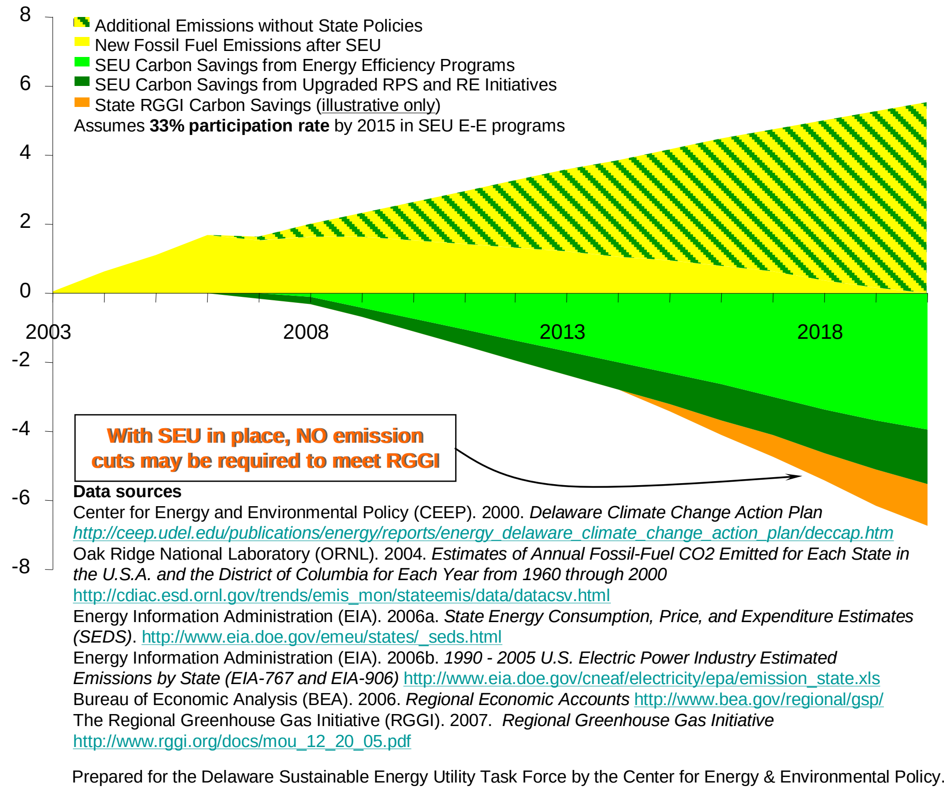
[3] The SEU Task Force modeled its Sustainable Energy Bond on the actions of the City of Can Francisco and proposed legislation by the State of Hawaii. On November 6, 2001, San Francisco approved a landmark $100 million Solar Bond initiative that provides funds for investment in end-use energy efficiency and customer-sited and public facilities-sited solar electric and other renewable energy systems. The measure pays for itself entirely from energy savings at no cost to taxpayers. After investigating the action of the City of San Francisco and a recently submitted bill in the Hawaii Legislature to authorize a special purpose, tax-exempt bond series for investments in sustainable energy facilities, the Task Force requested CEEP to analyze the feasibility of utilizing bonds floated in a competitive market for capitalizing the SEU. A summary of the resulting analysis can be found at: http://www.seu-de.org/docs/SEU_Finance_Presentation_Byrne_03-06.pdf

[4] Customer-sited renewables are frequently termed "distributed energy resources." The Task Force uses the two terms interchangeably, with the notation that the SEU will be chartered to serve all energy users and lower dependence on all conventional fuels. For a detailed discussion of customer-sited or distributed renewables, see: http://ceep.udel.edu/publications/energysustainability/2005_es_policy_options_distributed%20resources%5B1%5D.pdf

[5] The Task Force believes this is a conservative estimate of likely participation after 7 years of programming.



The Delaware Sustainable Energy Utility: *Real Cuts* in Carbon Emissions

2. Cost-effective Energy Efficiency, Conservation and Customer-sited Renewables are Abundant and Can be Used to Reduce Future AND Existing Power Plant Needs

The Task Force has provided detailed estimates showing that the SEU can furnish sizable, cost-effective reduction in peak demand of 400-500 MW through energy efficiency and conservation. When the SEU target of 300 MW of customer-sited renewables is additionally considered, the Task Force is confident that State electricity prices and long-term needs can be readily and significantly affected by such demand-side programs and policies.

a. Policy Lessons from Pioneer States

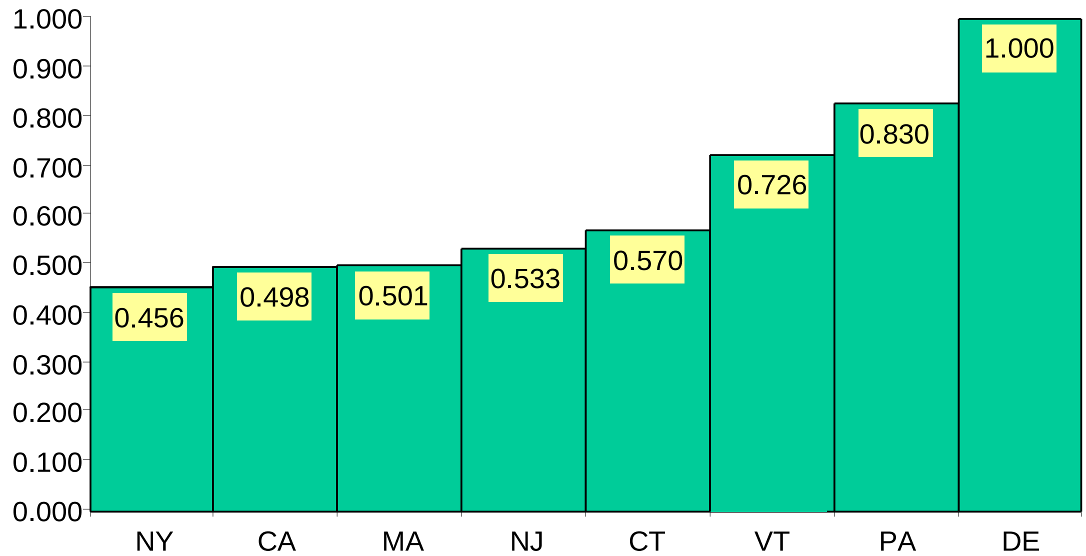
One method of assessing the available potential for demand-side resources to affect Delaware electricity prices and long-term needs is to compare the performance of the State with other states with well-documented, well-performing energy efficiency programs. [6]

[6] To enable this comparison, CEEP researchers constructed an econometric model to predict State residential electricity intensity as a function of prices, weather conditions, and policy/program infrastructure. State residential electricity consumption and price data for 2001-2005 were gathered from the U.S. Energy Information Administration. State income data were obtained from the U.S. Bureau of Economic Analysis for the same period. Weather data (heating and cooling degree days) for each state were taken from the U.S. National Oceanic and Atmospheric Administration's records. For electricity consumption and price data, see: Energy Information Administration (EIA). 2006. *Electric Power Annual 2005 - State Data Tables.* For income data, see: Bureau of Economic Analysis (BEA). 2007. *Regional Economic Accounts*. For weather data, see: National Oceanic and Atmospheric Administration. 2007. *Historical Climatological Series 5-1* and *Historical Climatological Series 5-2*.

CEEP research staff has extensively documented the energy efficiency programs and policies of California, Connecticut, Massachusetts, New Jersey, New York and Vermont, all of which are acknowledged leaders in the field of sustainable energy.[7] By contrast, Delaware and Pennsylvania have modest programs and policies with only recently supported initiatives. Thus, an analysis of the period of 2001-2005 will capture the effects of energy policies and programs in the six pioneering states and will reflect the comparatively minor policy and program commitments of the latter two states.

The model of energy intensity predicted by prices, weather and policy/program commitments, the model successfully explains 99.5% of the variance in State electricity intensity data; all estimates of the explanatory variables are robust and all act in the expected manner.[8]

Using the model's results and setting Delaware's electricity intensity at 1.000, we can numerically compare the effects of policy and program commitments *after* adjusting for price and weather differences among the eight states.



Prepared for the Delaware Sustainable Energy Utility Task Force by the Center for Energy & Environmental Policy.

Comparison of State Residential Sector Electricity Intensities (DE = 1.000)

The results are sobering: Delaware has the *highest* residential sector electricity intensity among the eight states. New York, California, Massachusetts and New Jersey households use *one-half or less* of the electricity used by Delaware homes, thanks to comparatively well-funded and extensive energy efficiency and conservation policy regimens. Because their programs were more recently created, Connecticut and Vermont residences use more electricity than those in the four best-performing states. Still, their homes consume only *55-70%* of the electricity of their Delaware counterparts. Only Pennsylvania is statistically near the rate of energy inefficiency of the Delaware residential electricity sector.

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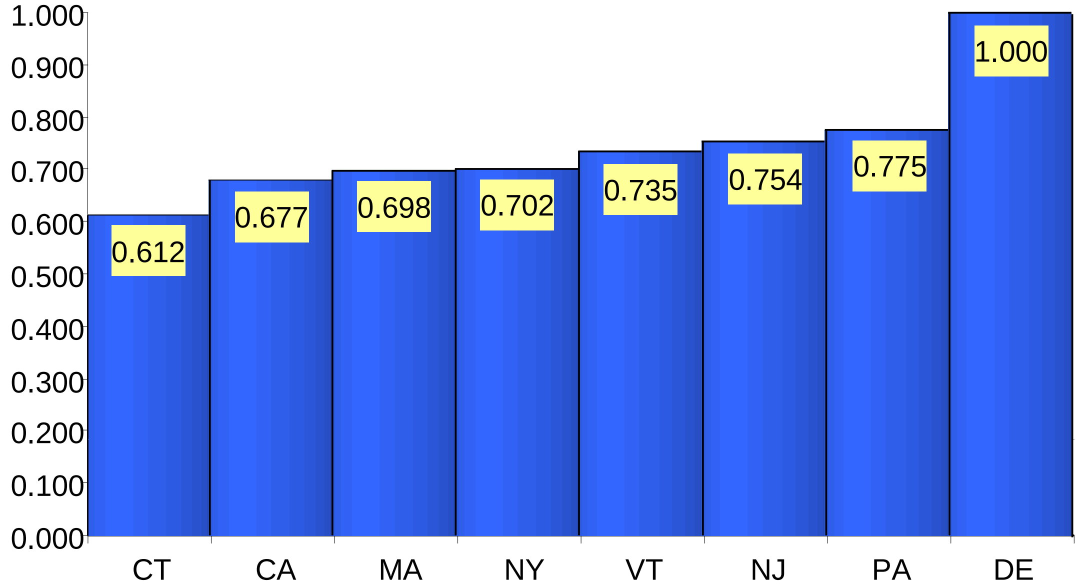
[7] See the Task Force *Briefing Book*, Sections F and H, and Appendix A for details. Available at: http://www.seu-de.org/documents.html

[8] See the Appendix at the conclusion of this briefing below for statistical detail regarding the model's performance.

A comparable analysis of the commercial buildings sectors of the eight states finds Delaware again the most energy inefficient. Once more, the model provides a robust estimate of electricity intensity, explaining 95.7% of the variance in the data and providing statistically significant estimates of the policy/program effects by State after price and weather differences are considered.[9]

In this sector, Connecticut, California, Massachusetts and New York are leaders in electricity efficiency, using 50-70% of the electricity that Delaware buildings consume to serve customers. Vermont and New Jersey are not far behind, using only 75% of Delaware's consumption and Pennsylvania's commercial buildings use only about 80% as much electricity as those in Delaware. Here, the difference in building code standards, as well as targeted incentives, account for part of the difference in energy efficiency.



Prepared for the Delaware Sustainable Energy Utility Task Force by the Center for Energy & Environmental Policy.

Comparison of State Commercial Sector Electricity Intensities (DE = 1.000)

Eventually, diminishing returns will militate against further reliance on energy efficiency options to stabilize conventional energy prices. At that point, long-term needs may then require consideration of major additions to central station power plant capacity. But the above estimates of c*omparative energy inefficiency in Delaware* suggest we are far from that day.

b. Lessons from California

Some skeptics of demand-side policies and programs doubt their effectiveness, especially during periods of unusually high peak demand and/or price spikes. The experience in California in 2000-2001 surely ranks as a clear case of extremely tight electricity supply, highly unusual weather, and previously unexperienced power plant outage and maintenance problems, all leading to exceptional wholesale price behavior and a rash of extraordinary supply emergencies.

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[9] See the Appendix at the conclusion of this briefing below for statistical detail regarding the model's performance.

In the two-year period, the State saw wholesale electricity clearing prices climb above $375 per MWh (December 2000), more than 10 times the average in previous years. There are many explanations for the onset of high prices and supply emergencies, not the least of which is market manipulation investigated by the Federal Energy Regulatory Commission.[10]

A less-often investigated question is how California managed to recover from what all agree was an unparalleled crisis in U.S. electricity history. The answer is instructive. With no ability to buy or build new power plant capacity fast enough to stabilize its electricity markets, the State turned to energy efficiency and conservation. Its utilities had reduced their use of these tools in the 1990s, believing that supply-focused strategies would be best for meeting State needs in a fast-changing economy. State programs similarly lost their luster and funding was lowered. Arguably, California's energy efficiency and conservation programs were the best in the country. Nonetheless, they were pushed to the periphery as supply-side thinking grew in importance. But in 2001, the apparatus was quickly returned to service as State policy committed funds and priority to their use. An investigation by the California Energy Commission[11] summarized the results of an initiative begun in September 2000, with the signing of Assembly Bill 970:

> By June 2001, the state actually achieved 5,570 megawatts of demand reduction with an additional 3,200 megawatts of reduction available by voluntary curtailments when necessary. This campaign contributed to a 6.7 percent reduction in overall electricity consumption in the state, and a 10 percent reduction during summer peak hours reaching a record reduction of 14 percent in June 2001. This remarkable accomplishment reflects the most aggressive and comprehensive energy conservation and efficiency effort in the history of our state. (p. 1)

With one of the largest, most complex and still fast-growing economies in the world, the State continues to require the addition of power plant capacity to meet its needs. But the key role of energy efficiency is now established in law. The California Public Utility Commission requires all utilities in the State to follow an energy resource loading order that recognizes "cost effective energy efficiency [as] the resource of first choice for meeting California's energy needs" (p. 2).[12] Second in the loading order for utility dispatch are customer-sited and other renewables. Only after these resources have been fully deployed is conventional generation to be used.

The State recently tested the efficacy and reliability of this loading order when it experienced a heat wave in July 2006 July 2006 with temperatures above 110 °F which had been exceeded in only "4 of the last 56 years"[13] and characterized by the California Independent Service Operator

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[10] See FERC. 2003. Final Report on Price Manipulation in Western Markets: Fact-Finding Investigation of Potential Manipulation of Electric and Natural Gas Prices. Docket NO. PA02-2-000Available at: http://fl1.findlaw.com/news.findlaw.com/hdocs/docs/ferc/wstmrkt32603rptpt1.pdf

[11] CEC. 2002. *The Summer 2001 Conservation Report*. Available at: http://www.energy.ca.gov/reports/CEC-400-2002-001/CEC-400-2002-001.PDF

[12] CPUC and CEC. 2005. Energy Action Plan II: Implementation Roadmap for Energy Policies. Available at: http://www.energy.ca.gov/energy_action_plan/2005-09-21_EAP2_FINAL.PDF

[13] CPUC. 2006. *Resource Adequacy Report*, p. 16.

as a “1-in-50 year heat storm” resulting in demand peaks not projected to be reached until 2011. The State turned again to its energy efficiency programs for relief. In response to a declared Stage 1 Emergency, California’s utilities turned to demand response and load shedding programs that realized a 1,217 MW reduction and managed its highest recorded peak demand without service interruption. [14]

As the State plans for summer 2007, the CPUC has ordered Southern California Edison (SCE) to expand its Air Conditioning Cycling Program to target an additional 300 MW of program capacity.

In their recent joint report, the CPUC and CEC observe:[15]

> Cost-effective energy efficiency is the resource of first choice for meeting California’s energy needs. Energy efficiency is the least cost, most reliable, and most environmentally-sensitive resource, and minimizes our contribution to climate change…For the past 30 years, while per capita electricity consumption in the US has increased by nearly 50%, California electricity use per capita has been approximately flat. This achievement is the result of continued progress in cost-effective building and appliance standards and ongoing enhancements to efficiency programs implemented by investor-owned utilities, customer-owned utilities, and other entities.

If California continues to find *gigawatt-scale peak reductions available from cost-effective energy efficiency resources* with possibly the country’s best-developed policy and program framework, it is likely that Delaware has ample, untapped energy efficiency and conservation ‘reserves’ still to utilize.

3. The SEU Invites Green Technology Innovation to Come to Delaware

Delaware can create vibrant markets for customer-sited renewable energy with effective policy based on current best practices. The Task Force proposes a renewable portfolio standard (RPS) upgrade that would require electricity providers to procure 20% of their electricity from renewable resources by 2019, with a 2% solar photovoltaics (PV) carve-out. This upgrade would bring Delaware into alignment with New Jersey’s nation-leading solar market, which is growing annually at over 50% and has sustained solar renewable energy certificate (REC) prices of over $0.20 per kWh. The New Jersey market is an example of how a state can make optimal use of customer-sited renewables – all of its solar market growth is based on customer-sited applications.

With an SEU-managed Delaware Green Energy Fund and a robust RPS, the SEU can use both incentives and competitive market forces to make customer-sited renewable resources fully competitive with retail electricity.

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[14] CA ISO. 2006. News Release, August 1.

[15] CPUC and CEC. 2005. *Energy Action Plan II*, p. 3 (see fn. 14)

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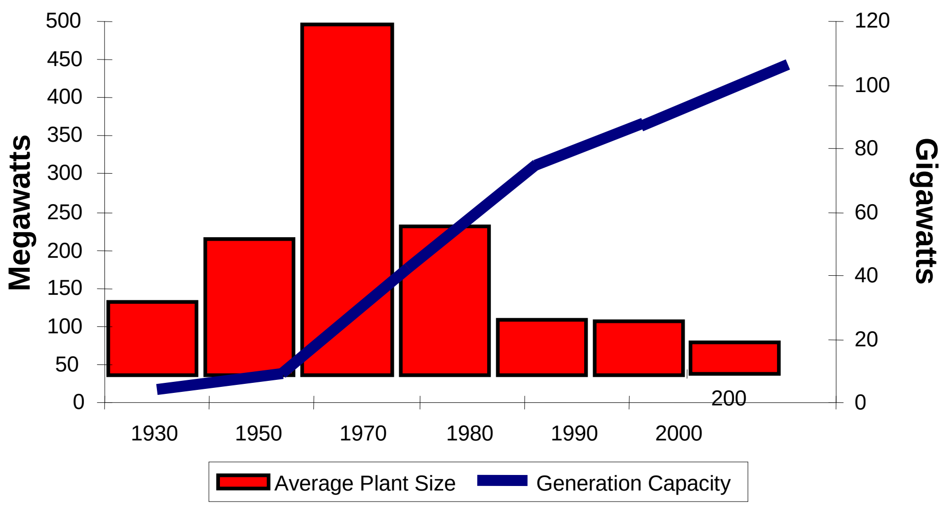
Several other states are working along similar paths. The Vermont legislature is currently considering legislation that would require 40% of its electricity resources to be produced from local renewable resources by 2018, with customer-sited renewables receiving special priority. Maryland's legislature is considering a bill that would create a 2% solar carve-out by 2022. California is working to increase its RPS to 33% by 2020.

By encouraging utilities to meet RPS requirements with customer-sited resources, the Task Force has determined that Delaware can install over 100 MW of customer-sited solar electric systems, plus an additional 200 MW or more of customer-sited geothermal, solar thermal, and wind systems at homes, businesses, and farms. These combined resources would provide Delawareans with at least 300 MW of customer-sited renewable resources by 2019.

The emphasis on distributed renewables is consistent with power plant capacity trends in the U.S. Since the 1970s, unit capacity of generating facilities has declined greatly.



Sources: T. R. Casten (1995) *The Energy Daily* (September 7), Hirsh. 1999: 274; and *EIA Electric Power Annual* (1981, 1990, 2000, 2006)

Trends in U.S. Power Plant Capacity

The strategy put forth by the SEU has a critical advantage over conventional proposals to increase electricity and other energy supplies. Proposals to add new, large-scale electricity and other energy capacity depend for their economics on locking in long-term contracts of 20-25 years to produce the necessary revenues for multi-billion dollar investments. The SEU recognizes the energy sector is undergoing dramatic technology change and avoids this error. Consistent with the trend in the above graph, the SEU focuses on appropriate scale, flexibly expanded technologies whose economics are modular (i.e., earnings are based on adding capacity when and as necessary in increments to meet growth and no more).[16] This approach reinforces the overall conservation philosophy of the SEU – *use only the energy you need, in the cleanest form possible, and without waste or barriers to the adoption of even cleaner, more efficient new technologies*.

[16] For a detailed discussion of the economics of customer-sited or 'distributed' energy supplies, see: http://ceep.udel.edu/ publications/energysustainability/2005_es_renewables&risk.pdf

4. The SEU Lowers Consumer Energy Prices and Bills

Energy efficiency, conservation and customer-sited renewable energy strategies are well-tested tools to achieve price stability goals. More than that, they have been shown by empirical research to lead to *lower* prices than would have occurred without investment in their services. Each tool is discussed in turn for its effects on conventional energy prices. Because the research literature on the subject is voluminous, it is not possible to summarize all of it here. Instead, representative findings have been selected.

a. Energy Efficiency and Conservation

A recent comprehensive study of the American Council for an Energy-Efficient Economy (ACEEE)[17] reports the following findings:

- "[I]investments in efficiency and conservation will create major economic benefits for Americans by *moderating gas prices* [and] *reducing energy bills*…" (p. 1, emphasis added)

- "Energy efficiency offers many…hedging benefits: by moderating demand growth, history has shown that small decrements in marginal demand can exert significant leverage on prices. In this sense, *energy efficiency may be our nation's best insurance against natural gas price volatility.*" (pp. 2-3, emphasis added)

A joint research effort of the Lawrence Berkeley National Laboratory and ACEEE[18] provides empirical estimates of the *price reduction effect* of energy efficiency investments. Comparing U.S. energy demand with and without energy efficiency policies in place, the authors found that natural gas prices were predicted to *decline* in real terms. In the base case, using the U.S. Department of Energy's National Modeling Energy System (NEMS), natural gas prices are projected to increase by 49% by 2020. Under the policy scenario prepared by LBL and ACEE based on well-established energy efficiency programs in the U.S. and their measured performance, electricity prices are projected to drop 7% and natural gas prices are projected to decline to below 1999 levels (e.g., to $1.9 per million Btus in 2020): "a *37% decline* from the base case."(Executive Summary, p. x).

Research conducted for the Regulatory Assistance Project on the New England region[19] concluded that investment in energy efficiency and conservation reduces the region's vulnerability to natural gas price spikes. To measure the ability of energy efficiency to provide reliability to energy systems, the author built a 12-month price duration curve for New England. The hours with the top 1% of highest energy prices accounted for 15.8% of the region's wholesale costs. Energy efficiency was then shown to lower peak demand, thereby obviating

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[17] Prindle, William. 2003. *Energy Efficiency Solutions to the Nation's Natural Gas Problems*. Washington, DC: American Council for an Energy-Efficient Economy.

[18] Nadel, Steven and Howard Geller. 2001. *Smart Energy Policies: Saving Money and Reducing Pollutant Emissions through Greater Energy Efficiency*. Washington, DC: American Council for an Energy-Efficient Economy.

[19] Cowart, 2001. *Efficient Reliability: The Critical Role of Demand-Side Resources in Power Systems and Markets*. Montpelier, VT: The Regulatory Assistance Project.

price spike vulnerability by a two-step process. First, energy efficiency and conservation avoid or significantly reduce use during the highest-priced hours. Second, the resulting lower peak demand reduces wholesale market prices for what are now the top hours. In this way, *demand reduction through energy efficiency and conservation mitigate the risks of high price spikes at peak times* (p. 9).

Research conducted to synthesize the findings of researchers on energy efficiency's 'hedge value'[20] found consistently positive and significant benefits. "Volatility decreases as demand decreases (for a constant supply); EE reduces hedging cost; EE can be more valuable than previously considered and should be given credit for the reduction of hedging cost" (p. 8). The researcher also notes that "Less demand = less volatility = less hedging" (p. 10).

Finally, a 2006 research survey published in the premier international journal *Energy Policy* sums up the findings on the role of energy efficiency and conservation in stabilizing or reducing prices and in aiding price risk management: "efficiency has…*inherent risk management benefits* (e.g. as a form of protection or 'hedge' against price volatility)…rarely acknowledged or otherwise weighted into the investment decision [of the utility]" (p. 191).

b. Customer-sited Renewables

When located at the site where conventional energy demand is generated and used to lower this demand, a renewable energy system exhibits the same effects on conventional energy prices as energy efficiency and conservation. In a detailed investigation of the impacts of the then-proposed Renewable Portfolio Standard (RPS) before the Delaware General Assembly in 2005, CEEP reported on extensive research about this matter. An extended quotation from pp. 3-4 of the Briefing Paper is provided below. Cited sources can be found in the original Paper available at http://ceep.udel.edu/energy/publications/2005_es_Delaware%20Senate_RPS%20briefing%20paper.pdf.

> "During the past 15 years, the majority of new US generating capacity has been fueled by natural gas. Over 95% of the 250 gigawatts of new generation added since 2000, has been natural gas-fired technology (Taub, 2003). At the same time, an increasing number of residences and businesses have opted to use natural gas for space heating. As a result, natural gas, which currently accounts for 25% of US energy use, is projected to expand by 1.5% annually at least through 2025 (US Energy Information Administration [EIA], 2005). As many utilities and retail customers have discovered, however, natural gas is proving to be a more volatile commodity than previously predicted (Henning et al., 2003).
>
> Recent supply shortages of up to 4 billion cubic feet per day have caused sudden price increases for natural gas. During the 1990s, natural gas prices hovered around $2.00 per million British Thermal Units (MMBTU). But over the last three years, natural gas prices have spiked to above $6 per MMBTU and have fluctuated dramatically (EIA, n.d.). While one would expect the market to eventually respond to these high prices, the

[20] Dickerson, Chris Ann. 2003. *Energy Efficiency Valuation as a Financial Hedge*. Presentation at ACEEE's National Conference on Energy Efficiency as a Resource (June 9-10, 2003). Accessed at http://www.aceee.org/conf/03ee/Dickerson-6w.pdf. Hedge value refers to the ability of an investment to improve asset value by lowering its vulnerability to sudden, large changes in market conditions, including price spikes.

outlook for increased supply in the near term is not promising: current stocks of natural gas in underground storage are unusually low due to a combination of cold weather, declines in domestic production, and declines in net imports (Cambridge Energy Research Associates, 2004). Moreover, even with increased supplies, the seasonal fluctuation in natural gas prices is likely to remain.

The combination of rising natural gas prices and fuel price volatility has contributed to electricity price increases across the country. Utilities typically seek to hedge their natural gas investments through the use of financial contracts like futures and options. Since renewable energy sources like wind and solar energy rely on fixed-price (i.e., free) fuel, they can serve as a direct hedge against natural gas fuel price volatility. Integrating wind energy and other renewable energy resources into a utility portfolio can provide a more complete physical hedge against natural gas price variation than conventional financial strategies (Bolinger et al., 2004). As a result, energy industry experts have argued that diversifying utility generation portfolios with renewable energy is an important best practice for utility managers to reduce fuel price volatility and stabilize electricity prices (Biewald et al., 2003; Roschelle & Steinhurst, 2004).

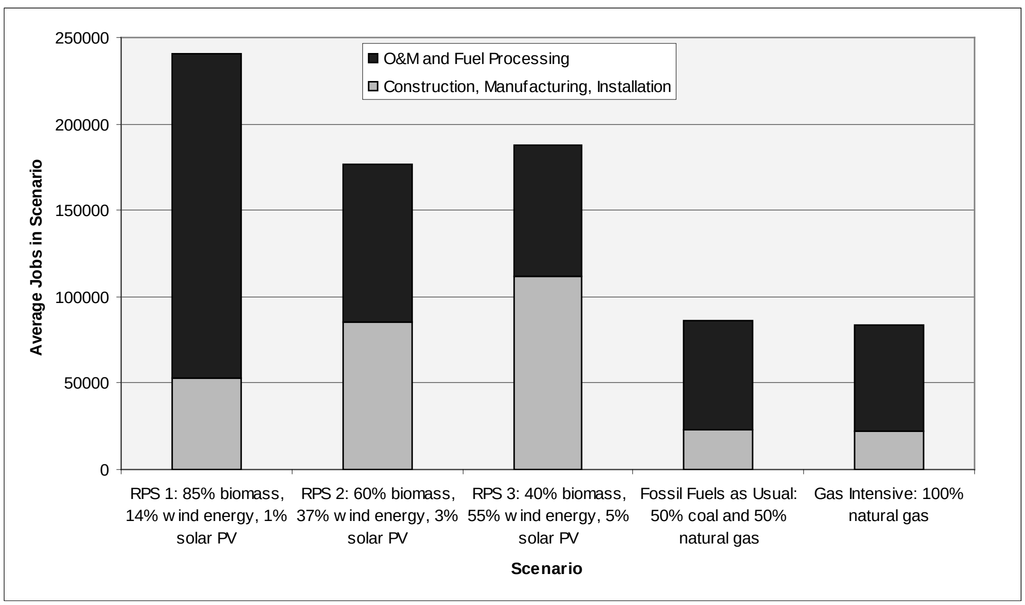
In addition to serving as a direct hedge against natural gas price variability, renewable energy development also produces downward pressure on natural gas prices by displacing natural gas generation and decreasing natural gas demand (Elliott et al., 2003). The National Renewable Energy Laboratory recently concluded that this price reduction effect can be significant, with a gas price reduction of up to 2% for each 1% of gas demand displaced (Wiser et al., 2005). As a result, it is possible that the above-market cost of renewable energy can be offset by natural gas price decreases caused by expanded use of these options."

The above-described effects are amplified when renewables are located at the customer's demand site. First, distribution losses are avoided, thereby improving the economic performance of these systems for customers over conventional central station technologies like utility-scale power plants. Like energy efficiency, customer-sited renewables improve end-use efficiency. Second, decreased demand for distribution capacity in peak periods benefits all grid-served customers, providing a 'decongestion' effect on line capacity demand (this is especially true for customer-sited renewables like solar thermal and photovoltaics, which generate most of their energy at demand peaks). Additionally, it lowers wear on distribution lines, thereby reducing the extent of near-term need for expensive distribution upgrades (again, benefiting all users). All of these effects enable Delaware's consumers to spend less on conventional energy services, lower their vulnerability to conventional energy price spikes, and create pressure on the conventional energy system to lower its prices and improve its performance. These benefits cannot be matched by a supply-side focus on central station technologies and investments.

5. The SEU Creates Permanent, New, High-Quality Jobs

The SEU focus on energy efficiency, conservation and customer-sited renewables has important, positive employment implications for the State. CEEP's RPS Briefing Paper (mentioned above) summarizes research on this question. An extended quotation is taken from pages 10-11 of the Briefing Paper, regarding the potential employment impacts of customer-sited renewable energy development.

"The Renewable and Appropriate Energy Laboratory (RAEL) at the University of California, Berkeley analyzed and compared the results of thirteen different job creation studies in a report entitled, *Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?* (Kammen et al, 2004). RAEL concluded that renewable installations generate more construction, manufacturing, and installation jobs than do coal and natural gas plants. RAEL also noted that job growth in the traditional fuel and utility industries has declined as a result of mechanization and mergers, while job growth in the renewable energy industries has accelerated as a renewable energy markets have expanded. To better illustrate the comparative job creation effect of renewable energy development, RAEL developed five future energy scenarios [see bar chart below]. The first three scenarios assume a 20% national RPS, while the second two scenarios assume that all future energy needs are met with coal or natural gas. The RPS scenarios create 176,000-241,000 new jobs, while the fossil fuel scenarios create only 86,000 and 84,000, respectively.



Source: Kammen et al (2004)

Comparison of Average Employment from Five Electricity Generation Scenarios

In creating these scenarios, RAEL used data from a job creation study completed by the Renewable Energy Policy Project (REPP) in 2001…REPP also concluded that investments in renewable energy development have a more significant job creation affect than equivalent investments in fossil fuel generation. [Their estimate is] every million dollars invested in wind energy generates 5.7 person-years [of employment], while every million dollars invested in solar photovoltaic systems creates 5.65 person-years of employment. By comparison, every million dollars invested in coal technology creates …3.96 jobs… A study by the NJPIRG Policy & Law Center found that "tens of thousands of well-paying jobs" would be created if the Mid-Atlantic region developed its renewable resources. If 10% of the homes in the Mid-Atlantic region installed 2 kilowatt solar systems, for example, NJPRIG calculated that 13,790 new jobs would be created (Algoso & Rusch, 2004)."

Even greater job generation potential from energy efficiency has been reported in the research literature. A comprehensive effort to estimate the net employment effects of a shift to a more energy-efficient economy based on current technology was completed in 2003.[21] It concluded that 870,000 net new jobs would be created by 2010 from energy efficiency over a business-as-usual scenario in which energy intensity is held constant. This takes into account any losses in the conventional energy sector. The created jobs vary from positions in manufacturing where the new technologies are produced, to wholesale and retail services where the technologies are sold, and to the trades where the technologies are installed. Using an econometric model to estimate job generation from energy efficiency, a joint study of the Economic Policy Institute, Tellus Institute and the Center for a Sustainable Economy[22] concludes that a net increase of 1.4 million jobs can be projected through 2020 if currently cost-effective technologies diffuse rapidly into the U.S. economy.

Delaware's share of the new employment has not been studied in depth, but the Apollo Alliance, a partnership of national labor and environmental organizations,[23] has posted a model on its website to estimate each State's potential job gains and losses. The Alliance estimates that over a 10-year period of investment in cost-effective energy efficiency options, Delaware would gain 9,885 permanent new positions, including 1,250 new manufacturing jobs and 1,497 new construction jobs.

A DELAWARE FIRST

Delaware has the extraordinary opportunity to create the first Sustainable Energy Utility in the country. This opportunity comes at a time in our State's and our country's history, and at a time in ecological history, where a new energy direction is needed.

Currently, the First State lags behind others in the promotion and utilization of sustainable energy resources. The Task Force believes the SEU is the proper vehicle for us to catch up. We are encouraged by the recent assessment of the SEU model by a pioneer in the field, *Efficiency Vermont* (see below). We invite Delawareans to make history by supporting legislation to create the Sustainable Energy Utility.

You can better inform yourself about this exciting initiative by visiting the Task Force's website: http://www.seu-de.org/. Legislation to create the SEU will appear shortly on this website.

[21] Geller, Howard. 2003. *Energy Revolution.* Washington, DC: Island Press. Dr. Geller was Executive Director of the American Council for an Energy-Efficient Economy, founding its Washington, DC office in 1981 and serving in that position until 2001.

[22] Barrett, James P., Andrew Hoerner, Steve Bernow and Bill Dougherty. 2002. *Clean Energy and Jobs: A Comprehensive Approach to Climate Change and Energy Policy.* Washington, DC: Economic Policy Institute and Center for Sustainable Economy.

[23] Apollo Alliance. 2007. *The Impact of the Proposed Apollo Project on the Economy of Delaware (Average of 10-Year Investment Cycle and Permanent Effects (In Constant 2004 Dollars))—Detailed Sectoral Results.* Available at: http://www.apolloalliance.org/state_and_local/delaware/dejobs.cfm

LETTER FROM *EFFICIENCY VERMONT*

Efficiency Vermont
your resource for energy savings

www.efficiencyvermont.com

255 South Champlain Street, Suite 7 • Burlington, VT 05401-4894 • phone: 802-860-4095 • toll-free: 888-921-5990 • fax: 802-658-1643

April 5, 2007

Charlie T. Smisson, Jr.
State Energy Coordinator
Delaware Energy Office
146 South Governors Avenue
Dover, DE 19904

Dear Charlie:

Thank you for giving me the opportunity to review a copy of the Task Force's report on the proposed Sustainable Energy Utility for Delaware. I found this to be an enormously exciting and promising development that could bring Delaware to a leading position as a national model for how states can act to reduce energy use and our national carbon footprint.

We are flattered that you have chosen a fundamental financial structure based on the model that has proven to be so successful here in Vermont. Efficiency Vermont has clearly demonstrated that an independent entity dedicated to delivering energy savings is effective, trusted, accountable, and cost-efficient.

Delaware's approach of extending its demand-side utility activity to encompass non-regulated fuels, transportation, and the development of renewables, while also including electrical energy efficiency, is a logical and critically important next step. We would be very enthusiastic about sharing our experience, documents, and lessons learned with whoever is selected to operate the utility.

In addition, we look forward to learning from Delaware as you further this well-thought-out initiative. Please do not hesitate to contact me if we can provide any additional assistance.

Sincerely,

Blair Hamilton

Blair Hamilton
Director

APPENDIX

The econometric model prepared by CEEP researchers separately predicts State residential and commercial building sector electricity intensity as a function of sector electricity prices, weather conditions, and policy/program infrastructure. State residential electricity consumption and price data for 2001-2005 were gathered from the U.S. Energy Information Administration. State income data were obtained from the U.S. Bureau of Economic Analysis for the same period. Weather data (heating and cooling degree days) for each state were taken from the U.S. National Oceanic and Atmospheric Administration's records. For electricity consumption and price data, see: Energy Information Administration (EIA). 2006. *Electric Power Annual 2005 - State Data Tables.* For income data, see: Bureau of Economic Analysis (BEA). 2007. *Regional Economic Accounts*. For weather data, see: National Oceanic and Atmospheric Administration. 2007. *Historical Climatological Series 5-1* and *Historical Climatological Series 5-2*. State program/policy infrastructure is reported in detail in the Briefing Book prepared for the SEU Task Force (available at http://www.seu-de.org/docs/SEU_Full_Report.pdf – see especially Sections F and H, and Appendix A). Including Pennsylvania in the model with Delaware – both of which have modest programs to promote energy efficiency and customer-sited renewable energy development – allows a cross-check of the model's predictions.

The model of residential building sector electricity intensity predicted by prices, weather and policy/program commitments, successfully explains 99.5% of the variance in State electricity intensity data; all estimates of the explanatory variables are robust and all act in the expected manner. Using the model's results (which requires conversion from their original logarithm form) and setting Delaware's residential building sector electricity intensity at 1.000, the effect of policy and program commitments *after* adjusting for price and weather differences among the states can be compared (see p. 5 above). The model of commercial building sector electricity intensity provides a similarly robust estimate of electricity intensity, explaining 95.7% of the variance in the data and furnishing statistically significant estimates of the policy/program effects by State after price and weather differences are considered. The signs of all terms are as expected. Again, setting Delaware's commercial building sector electricity intensity at 1.000, comparisons among states are available (see p. 6 above).

Statistical detail regarding the performance of the model for both residential and commercial building sector electricity intensity estimation is provided in the following tables. Additional discussion of the model can be found in the filed comments of the SEU Task Force in DE PSC Docket Nos. 06-241 & 07-20, pp. 9-12 (available at http://www.seu-de.org/docs/IRP_submission_4-10-07.pdf).

Statistical Detail for the Residential Building Sector Electricity Intensity Model				
Method: Least Squares				
Included observations: 40				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PRICE_RES	-0.093712	0.080691	-1.161369	0.2546
Degree Days	0.141612	0.052645	2.689960	0.0116
D1 (NY)	3.198638	0.543682	5.883287	0.0000
D2 (CA)	3.286077	0.505603	6.499318	0.0000
D3 (MA)	3.292275	0.537361	6.126751	0.0000
D4 (NJ)	3.354333	0.527645	6.357182	0.0000
D5 (CT)	3.420913	0.534167	6.404198	0.0000
D6 (VT)	3.663360	0.549695	6.664350	0.0000
D7 (PA)	3.797427	0.526068	7.218504	0.0000
D8 (DE)	3.983360	0.515629	7.725250	0.0000
R-squared	0.994868	Mean dependent var	4.503452	
Adjusted R-squared	0.993329	S.D. dependent var	0.288073	
S.E. of regression	0.023529	Durbin-Watson statistic	2.170422	
Sum squared residuals	0.016608			

Statistical Detail for the Commercial Building Sector Electricity Intensity Model				
Method: Least Squares				
Included observations: 40				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PRICE_COM	-0.038594	0.105777	-0.364863	0.7178
Degree Days	0.069694	0.077562	0.898559	0.3760
D1 (NY)	4.061541	0.791327	5.132569	0.0000
D2 (CA)	4.025604	0.740784	5.434246	0.0000
D3 (MA)	4.055845	0.784244	5.171661	0.0000
D4 (NJ)	4.133190	0.767709	5.383799	0.0000
D5 (CT)	3.924838	0.775451	5.061362	0.0000
D6 (VT)	4.107223	0.799577	5.136747	0.0000
D7 (PA)	4.159587	0.766455	5.427046	0.0000
D8 (DE)	4.415080	0.748656	5.897343	0.0000
R-squared	0.957361	Mean dependent var	4.627125	
Adjusted R-squared	0.944570	S.D. dependent var	0.145323	
S.E. of regression	0.034214	Durbin-Watson statistic	1.666272	
Sum squared residuals	0.035119			

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