THE STATE ENERGY EFFICIENCY SCORECARD FOR 2006

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EXECUTIVE SUMMARY

More and more states are turning to energy efficiency as the "first fuel" in the race for clean and secure energy resources. In their commitments to advance energy efficiency policies and programs, they are outpacing the federal government by a widening margin. States now spend about three times as much on energy efficiency programs as the federal government, and are leading the way on appliance standards, building codes, energy efficiency resource standards, and other key policies that drive energy efficiency investment. In this era of state pre-eminence, it is important to document best practices and recognize leadership among the states, so that other states follow, and to encourage federal action to catch up. Toward that end, ACEEE developed this report as a comprehensive ranking of state energy efficiency policies and identified exemplary programs and policies within each policy category. The report ranks states based on their progress in eight energy efficiency policy categories:

1. Spending on Utility and Public Benefits Energy Efficiency Programs
2. Energy Efficiency Resource Standards (EERS)
3. Combined Heat and Power (CHP)
4. Building Energy Codes
5. Transportation Policies
6. Appliance and Equipment Efficiency Standards
7. Tax Incentives
8. State Lead by Example and Research & Development

Summary of Rankings

Table ES-1 contains a summary ranking of the states on the eight policy categories included in this study. The "top ten" states, based on their combined scores, are:

1. Vermont, Connecticut, and California (tie)
4. Massachusetts
5. Oregon
6. Washington
7. New York
8. New Jersey
9. Rhode Island, Minnesota (tie)

The top ten states earn scores between 20 and 33 out of a possible 44 points, and the next fifteen states' scores trail fairly moderately behind: all score more than 10 points, up to 17.5 points. The bottom 26 states, however, seriously lag behind the other states, scoring between 0.5 and 10 points.

Table ES-1. Summary of State Scoring on Energy Efficiency

Rank	State	Utility Spending on EE	EERS	Combined Heat & Power	Building Codes	Transportation Policies	Appliance Standards	Tax Incentives	State Lead by Example	TOTAL SCORE
	Maximum Points:	*15*	*5*	*5*	*5*	*5*	*3*	*3*	*3*	*44*
1	Vermont	15	5	3	3	4	2	0	1	33
1	Connecticut	11	5	5	4	4	1	2	1	33
1	California	7	5	5	5	3	3	2	3	33
4	Massachusetts	13.5	0	4	2.5	4	2	1	2	29
5	Oregon	11.5	0	4	4	3	2	3	0.5	28
6	Washington	9.5	3	3	4	4	2	1	0.5	27
7	New York	5	0	5	3	5	2	2	3	25
8	New Jersey	7	1	5	2.5	4	1	0	1.5	22
9	Rhode Island	8.5	0	1	4	4	2	0	0.5	20
9	Minnesota	7	3	3	4	2	0	0	1	20
11	Texas	2	5	4	4	1	0	0	1.5	17.5
12	Wisconsin	6.5	0	3	3	2	0	0	2.5	17
13	Iowa	6.5	0	2	4	1	0	0	3	16.5
14	Pennsylvania	0	3	4	4	4	0	0	1	16
15	Colorado	1.5	5	3	3	0	0	1	2	15.5
15	Maine	6.5	0	2	2	4	0	0	1	15.5
15	Hawaii	4.5	3	3	2	1	0	0	2	15.5
18	New Hampshire	7.5	0	1	3	1	0	0	2	14.5
18	Nevada	2	5	2	4	0	0	1	0.5	14.5
20	Maryland	0	0	2	4	4	1	1	2	14
21	Montana	5.5	0	0	4	0	0	3	0.5	13
22	District of Columbia	2.5	0	0	4	1	0	3	2	12.5
23	Arizona	0.5	0	2	3	1	2	1	2	11.5
24	New Mexico	0.5	0	3	4	1	0	1	1.5	11
25	Idaho	3	0	2	4	0	0	1	0.5	10.5
26	Illinois	0	3	2	3	1	0	0	1	10
27	Utah	4.5	0	0	4	0	0	0	1	9.5
27	Ohio	0.5	0	3	4	1	0	0	1	9.5
29	Florida	2.5	0	0	4	1	0	0	1.5	9
30	Delaware	NA	0	3	3	2	0	0	0.5	8.5
30	North Carolina	0	0	2	3.5	1	0	0	2	8.5
30	South Carolina	0.5	0	2	4	0	0	1	1	8.5
33	Michigan	0.5	0	3	1	1	0	0	2	7.5
34	Kansas	0	0	2	4	0	0	0	1	7
35	Nebraska	1.5	0	1	4	0	0	0	0	6.5
35	West Virginia	0.5	0	2	4	0	0	0	0	6.5
35	Kentucky	0.5	0	0	3.5	1	0	0	1.5	6.5
38	Virginia	0	0	2	4	0	0	0	0	6
38	Georgia	0	0	0	4	2	0	0	0	6
40	Louisiana	0	0	0	3.5	0	0	2	0	5.5
41	Indiana	0	0	3	2	0	0	0	0	5

Rank	State	Utility Spending on EE	EERS	Combined Heat & Power	Building Codes	Transportation Policies	Appliance Standards	Tax Incentives	State Lead by Example	TOTAL SCORE
41	Alaska	0	0	2	2	1	0	0	0	5
43	Tennessee	1.0	0	1	1	1	0	0	0	4
44	Oklahoma	0	0	0	2.5	0	0	1	0	3.5
45	Arkansas	0	0	0	3	0	0	0	0	3
46	Missouri	0	0	0	1.5	0	0	0	0.5	2
46	Alabama	0	0	1	0	0	0	0	1	2
48	South Dakota	0.5	0	1	0	0	0	0	0	1.5
49	Mississippi	0	0	1	0	0	0	0	0	1
49	Wyoming	0	0	1	0	0	0	0	0	1
51	North Dakota	0.5	0	0	0	0	0	0	0	0.5

What are the benefits of being a "top ten" state in energy efficiency policies and programs? Based on other research and staff judgment, states with the most robust and diverse efficiency policies offer their citizens:

- More sustainable rates of growth in energy demand
- Reduced risk of price increases and price volatility
- Lower total energy bills
- Reduced risk of blackouts and energy shortages
- Minimized need for controversial, expensive, and environmentally damaging energy supply projects
- A major stimulus for the state economy that produces more jobs per dollar invested than energy supply investments
- Cuts in emissions of air pollutants and greenhouse gases

States that use energy efficiency to balance and diversify their energy markets could be seen, using a financial markets metaphor, as good fund managers who use efficiency as a hedging strategy and to position their portfolios for balanced growth. The top ten states are generally characterized by having limited in-state supplies of conventional fossil energy resources. They have long understood that they cannot rely on conventional sources, for security of supply or other reasons. By contrast, the lower-scoring states have been typically endowed with abundant amounts of traditional energy sources that have been historically inexpensive. Such states might rank well in historical terms on simple measures like nominal energy prices. However, to the extent they are dependent on one or a few of such conventional supplies, they put their energy markets at risk for higher prices and total bills, blackouts or other shortages, and environmental damage.

We note that some states at the lower end of our rankings have recently begun to take steps to balance their energy markets through new initiatives on energy efficiency. As fossil fuel prices continue to rise and show increased volatility, as the difficulties and costs of building major new supply projects mount, and as environmental "trump cards" such as global warming begin to place a heavier burden on the burning of fossil fuels, we expect more states up and down our ranking scale to turn to energy efficiency as a hedge as well as a good investment in its own right.

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INTRODUCTION

States are rapidly outpacing the federal government in demonstrating leadership and innovation in energy policy. More and more states are turning to energy efficiency as the "first fuel" in the race for clean and secure energy resources. In the 1970s, when the end of the era of cheap energy was heralded by the OPEC oil embargo, the federal government led the way with landmark energy policies, including Corporate Average Fuel Economy (CAFÉ) standards for vehicles and efficiency standards for appliances. Even then, however, states took the first strides on many of these issues. Since the 1970s, states collectively have eclipsed federal efforts, both in the scope of their policies and their spending commitments. States now spend about three times as much on energy efficiency programs as the federal government, and are leading the way on appliance standards, building codes, energy efficiency resource standards, and other key policies that drive energy efficiency investment.

In this New Federalist era of state pre-eminence, it is important to document best practices and recognize leadership among the states, to provide practical models for other states to follow and to encourage federal action to catch up with and complement state efforts. Toward that end, ACEEE developed this report, with grant support from the U.S. Environmental Protection Agency. The report provides a comprehensive ranking of state energy efficiency policies and identifies exemplary programs and policies within each policy category. This ranking system reviews state progress in eight energy efficiency policy categories:

1. Spending on Utility and Public Benefits Energy Efficiency Programs
2. Energy Efficiency Resource Standards
3. Combined Heat and Power
4. Building Energy Codes
5. Transportation Policies
6. Appliance and Equipment Efficiency Standards
7. Tax Incentives
8. State Leading by Example and Research and Development

ACEEE has published state rankings and policy reviews in the past, including the *State Scorecard on Utility Energy Efficiency Programs* in 2000 (Nadel, Kubo, and Geller 2000), an update in 2002 (York and Kushler 2002), and *ACEEE's 3rd National Scorecard on Utility and Public Benefits Energy Efficiency Programs* (York and Kushler 2005). Those reports analyzed utility spending on energy efficiency programs in each state. In 2003, ACEEE published a broader review of energy efficiency policies in *Energy Efficiency's Next Generation* (Prindle et al. 2003). However, we have not previously reported rankings on a broad set of efficiency policies. This report thus "connects the dots" by providing a more comprehensive approach to scoring and ranking states on energy efficiency policies.

OVERVIEW OF METHODOLOGY

Scoring

To score states on energy efficiency, we first identified eight policy categories that both promote energy efficiency and have been pursued in several states in recent years. Among other things, this set of policies works to procure funding for efficiency, mandate energy savings targets, reduce market and regulatory barriers, establish mandatory codes and standards, and increase public visibility of energy efficiency as an energy resource. The eight policy categories are listed in the table below.

We then created a scoring system that assigns a maximum score for each policy category, weighting policy categories based on approximate energy savings impacts, i.e. state policies that result in the highest energy savings have the highest maximum score. The weighting of policy areas was informed by both ACEEE staff and outside expert judgment and a recent analysis from the Western Governors Association that evaluated the relative energy savings impacts from state-level policies (WGA 2006).

We started with a benchmark of 5 points in each policy category and adjusted the weighting of each category depending on energy savings impacts. For example, the WGA analysis found that in a "best practices" scenario, building energy codes can reduce electricity consumption by about 4% by 2020. In the same scenario, utility spending on electric energy efficiency programs can reduce consumption by about 12%, or approximately three times the savings as building energy codes. To account for this difference in energy savings impacts, we assign a maximum score of 5 to building energy codes, and three times that, or a maximum score of 15, to spending on utility sector efficiency programs. The other policy categories were adjusted in a similar way, also relying on expert judgment. See the table below for the maximum scores possible for each category.

Maximum Scores for each Policy Category

Policy	Maximum Score
Spending on Utility and Public Benefits Energy Efficiency Programs	15
Energy Efficiency Resource Standards	5
Combined Heat and Power	5
Building Energy Codes	5
Transportation Policies	5
Appliance and Equipment Efficiency Standards	3
Tax Incentives	3
State Facilities and Research and Development (R&D)	3
Maximum Total Score	**44**

Within each policy category, we then developed a scoring methodology based on a subset of criteria and assigned a score for each state based on extensive review and communication with experts in the field. See each policy chapter for a description of the methodology.

Caveats

States are paving the way for energy efficiency in the U.S., passing several types of legislation and regulation in recent years to promote energy efficiency. Comparison among state-level policies and regulations is crucial to assess progress and identify weak points. Our *Scorecard* represents a significant first effort at evaluating state performance in the energy efficiency industry; however, we recognize its limitations, and in that spirit we offer several caveats.

One way to score states would be to evaluate annual energy savings (in each state) that result from utility-sector energy efficiency programs. These data have been available from the Energy Information Administration (EIA) in the past; however, the completeness and accuracy of the data set has weakened over the years. Because the savings data must be collected from many different sources, and as more and more energy efficiency programs are being run by non-utilities, it has become harder to collect and reconcile the data. Data on energy efficiency spending, however, has been more accurately and consistently tracked by utility efficiency programs and reported to the EIA (see Chapter 1). Funding provided to efficiency programs has been found in the past to reliably correlate with end-use energy savings. It is therefore a reliable way to evaluate utility energy efficiency programs on a macro level, and we therefore heavily weight this policy category. However, the main limitation to this methodology is that a specific level of funding for one program may result in greater or lesser energy savings compared to the same funding provided to another program. Still, macro-level spending on energy efficiency represents the next-best approach when accurate data on efficiency savings is unavailable.

In addition to utility spending on energy efficiency, we evaluated several other state policy actions that help promote energy efficiency. Similar legislation and regulations, however, do not always result in comparable energy savings. For example, states with the most stringent building energy codes and standards may experience different levels of compliance. Similarly, state tax incentive programs have met with varying levels of success. These data, however, have in many cases not yet been compiled by states; in cases where the data are available, some states have just started to compile them. This level of detail is therefore beyond the scope of this project. In each chapter, we point out these caveats and suggest possible additions and revisions to future methodologies of the *Scorecard*.

Energy Prices and Gross State Product

Although utility spending on energy efficiency programs is one of the best indicators of state energy efficiency program performance, and therefore is weighted heavily in our scoring, it is important to recognize the role that economic forces may play in motivating utility spending on energy efficiency. It is sometimes argued, for example, that high energy prices raise the urgency for state action on energy issues. Whereas high retail energy prices may motivate states to spend more on energy efficiency, states with historically lower prices may not have experienced the pressure to spend aggressively on energy efficiency. For example, California and most Northeast states have historically had high retail electricity rates and have also tended to commit high levels of spending to energy efficiency. It has also been argued that states with a high gross state product (GSP) per capita may be in a better financial position to spend on energy efficiency programs whereas states with lower than average GSP may not have the leverage to spend aggressively on efficiency.

Our review of these data finds a positive but not very strong correlation between 2004 state retail electricity prices and 2004 levels of utility spending on energy efficiency per capita (coefficient=0.49) and between GSP per capita and efficiency spending (coefficient=0.45) (see Appendix A).[1] Whereas higher retail electricity prices and higher GSP per capita tend to be correlated with greater spending on efficiency, there are numerous political, economic, social, and historical factors that also contribute to a state's level of efficiency spending. Given that these factors are not captured in this preliminary assessment, it is impossible to determine the precise influence energy prices and GSP have on energy efficiency spending.

Although we do not take these criteria into account in our scoring methodology, we did examine trends in these data. In Appendix Table A-1, we list average 2004 retail rates of electricity and 2001 GSP per capita for all states. In 2004, the national average retail electricity rate was 7.57 cents/kWh. The average per capita spending on energy efficiency programs in the same year was $4.93 and the median was $1.64. See Chapter 1 for a detailed review of utility spending on efficiency programs. In 2001, the average state GSP per capita was $31.4 thousand (Abt Associates 2006). It may be of interest to note the states that have not had the economic conditions that might be expected to support spending on energy efficiency (i.e., states with lower than average retail electricity prices and per capita GSP) and yet have higher than average per capita utility spending on efficiency programs. This scenario exists in five states based on 2004 data: Idaho, Iowa, Montana, Utah, and Wisconsin.

CHAPTER 1: UTILITY AND PUBLIC BENEFITS ENERGY EFFICIENCY PROGRAMS

Background

The electric utility industry in the United States has undergone major changes over the past decade. A wave of restructuring activity swept over the nation beginning in the mid-1990s, with many states choosing to partially deregulate and restructure their electric utility industries to introduce competition at both the retail and wholesale levels. One result of such restructuring was a precipitous decrease in funding for ratepayer-funded electric energy efficiency programs,[2] from almost $1.8 billion in 1993 to about $900 million in 1998 (nominal dollars). Principal reasons for this decline included uncertainty about newly restructured markets and the expected loss of cost recovery mechanisms for energy efficiency

[1] We looked at electricity prices rather than natural gas prices because our data on energy efficiency spending tracks electricity energy efficiency programs only (see Chapter 1). We report electricity prices from the Energy Information Administration (EIA 2006a) for the year 2004 because the available data on utility spending on energy efficiency is also reported for 2004.

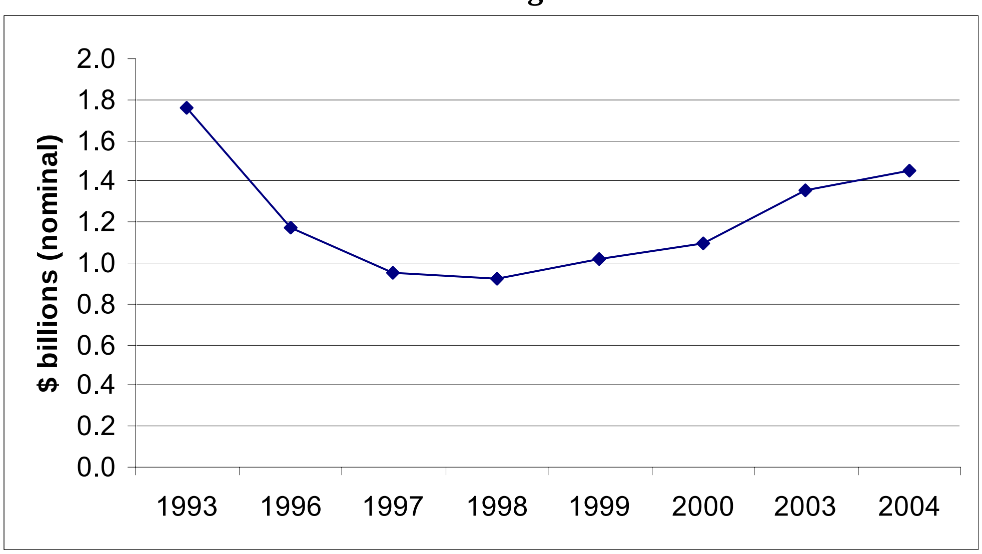
[2] By "ratepayer-funded energy efficiency" programs, we mean energy efficiency programs funded through charges included in customer rates or otherwise paid via some type of charge on customer utility bills. This includes both utility-administered programs and "public benefits" programs administered by other entities. We do not include data on separately funded low-income programs, load management programs, or energy efficiency research and development.

and demand-side management (DSM) programs. Generally utilities and many regulators did not see most DSM programs as being compatible with competitive retail markets. The thinking was that pricing and other market mechanisms would guide customer decisions about energy efficiency, not regulatory-driven DSM programs.

Experience with restructuring has proven the continued value of and need for these types of energy efficiency programs. Deregulated markets did little to promote efficiency (Kushler and Witte 2001), and some regions under-invested in new infrastructure, contributing to reliability problems such as in the Northeast blackout of 2003 (U.S.-Canada Task Force 2004). In response to these lessons, ratepayer-funded electric energy efficiency programs have entered an era of renewed focus and importance. Research by ACEEE documents a clear upward trend in spending on these programs ever since such spending had reached a low point in the late 1990s (see Figure 1.1). For 2004, we found that total spending on ratepayer-funded energy efficiency programs had reached $1.45 billion and our more recent experience indicates that this upward trend is continuing (York and Kushler 2006).

The structure and delivery of ratepayer-funded programs have changed dramatically over the past decade, mostly in conjunction with restructuring efforts. In the 1980s and 1990s, such programs were almost the exclusive domain of utilities. They administered and implemented programs under regulatory oversight. With the advent of restructuring, however, numerous states enacted "public benefits" energy programs that in many cases established new structures and tasked new organizations with the responsibility of administering and delivering energy efficiency and related customer energy programs (including low-income energy programs and renewable energy programs). Not all public benefits programs are administered or delivered by non-utility organizations, however. In quite a few cases there is a public benefits funding mechanism, but this goes to the utilities to administer and implement the programs.

Figure 1.1 Total Ratepayer-Funded Electric Energy Efficiency Program Spending from 1993 through 2004



Source: York and Kushler (2006)

Spending on these programs—whether administered and implemented by utilities or non-utility organizations—is a primary indicator of state-level support for energy efficiency. Spending levels are generally driven or set by legislative or regulatory authority. Many states have long records of relatively high levels of support for such program as evidenced by their spending on them. But ACEEE research over the past decade also has documented that a large share of states—about half—have not funded such programs to any significant level.

Methodology

The primary source of data for 2004 state spending is the Energy Information Administration (EIA 2005), which collects and reports utility data annually.[3] Data was also collected from individual states as needed, given the rise of non-utility energy efficiency programs (primarily "public benefits" programs). These data are for electric energy efficiency programs[4] and, depending upon the state, may include data from investor-owned utilities (IOUs), municipal utilities, cooperative utilities, other public power companies or authorities, and utility ratepayer-funded public benefits programs. (Note: when states have separately funded low-income programs, those amounts are not included in this dataset.[5])

States were scored on a scale of 0 to 15 based on levels of energy efficiency spending per capita. Table 1.1 lists scores for each level of spending. Every $1.50 of spending per capita earns one point and $0.75 per capita earns a half point. For the lowest scoring bin (0.5 points), we also gave a half point to states spending at least $0.50 per capita.

Caveats

In addition to spending on electric efficiency programs, state spending on gas efficiency programs and state energy savings data are also key indicators of state performance in the energy efficiency industry. These data were not tracked due to lack of adequate data; however, these would be beneficial to a future analysis. State funding data for electric energy efficiency programs are generally more accurate and consistent. Whereas spending is a good indicator of the performance of efficiency programs, it is important to note that funding does not always correlate to energy savings. Funding must be channeled into the appropriate well-developed programs to result in actual energy savings.

Due to the timing of EIA's release of energy efficiency spending data, 2004 data were the most recent available for this version of the *Scorecard*. Since 2004, several states have increased utility spending targets on energy efficiency. While data for some states was

[3] EIA data for 2004 was released in November 2005. Data for 2005 was released in November 2006 and therefore did not allow enough time to synthesize and collect additional state-by-state data.

[4] We do not report spending and savings data for natural gas energy efficiency programs because there is no national clearinghouse for these data as there is for electric energy efficiency programs (i.e., Energy Information Administration). Gathering these data would require state-by-state survey research, a task beyond the scope and resources of this project.

[5] We did not collect data on weatherization program funding, which is almost entirely federally funded—the federal Weatherization Assistance Program (WAP) gives money to states on a formula basis. Some states commit funds to leverage federal money; however, the scope of this project did not permit us to track these data.

available, it was not fair to score these states and not others. Therefore, we only report 2004 spending data, with the caveat that some states have made substantial increases in spending since then.

Table 1.1. Scoring Methodology for Utility Spending

Per capita spending range	Score	Per capita spending range	Score
> $ 22.50	15	> $ 11.25	7.5
> $ 21.75	14.5	> $ 10.50	7
> $ 21.00	14	> $ 9.75	6.5
> $ 20.25	13.5	> $ 9.00	6
> $ 19.50	13	> $ 8.25	5.5
> $ 18.75	12.5	> $ 7.50	5
> $ 18.00	12	> $ 6.75	4.5
> $ 17.25	11.5	> $ 6.00	4
> $ 16.50	11	> $ 5.25	3.5
> $ 15.75	10.5	> $ 4.50	3
> $ 15.00	10	> $ 3.75	2.5
> $ 14.25	9.5	> $ 3.00	2
> $ 13.50	9	> $ 2.25	1.5
> $ 12.75	8.5	> $ 1.50	1
> $ 12.00	8	> $ 0.50	0.5
		> $ 0	0

Spending on Energy Efficiency Programs

We score state spending on ratepayer-funded energy efficiency programs based on spending per capita (see Table 1.2), which is an obvious way to normalize total state spending amounts based on population. Nationally, the average electric energy efficiency spending per capita in 2004 was $4.93, with a range of zero to $22.54 and a median of $1.64. A total of 10 states spent more than $10 per capita on ratepayer-funded energy efficiency programs; a total of 17 states spent $5 or more per capita. The top twenty states (in terms of their spending per capita) account for 88% of nationwide spending on energy efficiency programs. The top ten states account for 63% of total national spending; adding the next five (the top 15) brings this up to 80%. These top states also represent a relatively large share of population, which improves this picture in terms of spending relative to population.

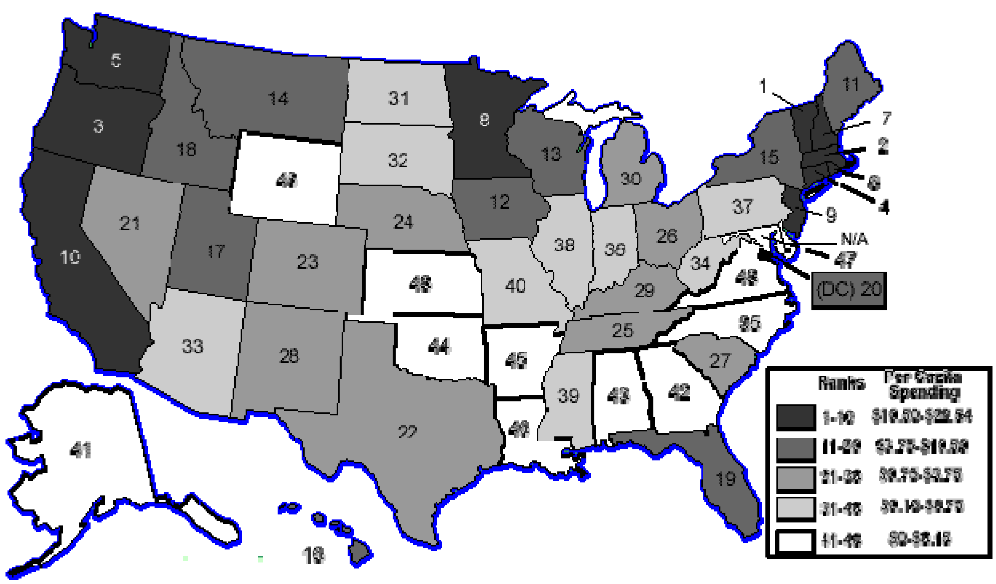
Table 1.2. 2004 Utility Spending by State: Total, Per Capita, Ranking by Spending Per Capita, and Scores*

	2004 Total Spending* ('$1000)	Per Capita Spending	Ranking by Spending per Capita	Score
Vermont	14,000	$22.54	1	15
Massachusetts	133,326	$20.81	2	13.5
Oregon	62,888	$17.51	3	11.5
Connecticut	58,098	$16.60	4	11
Washington	88,522	$14.26	5	9.5
Rhode Island	13,990	$12.95	6	8.5
New Hampshire	15,120	$11.64	7	7.5
Minnesota	55,784	$10.95	8	7
New Jersey	92,753	$10.68	9	7
California	380,009	$10.60	10	7
Maine	13,118	$9.98	11	6.5
Iowa	28,833	$9.76	12	6.5
Wisconsin	53,734	$9.76	12	6.5
Montana	8,002	$8.63	14	5.5
New York	147,193	$7.63	15	5
Hawaii	9,190	$7.28	16	4.5
Utah	16,450	$6.80	17	4.5
Idaho	7,023	$5.03	18	3
Florida	72,014	$4.14	19	2.5
District of Columbia	2,200	$3.97	20	2.5
Nevada	8,473	$3.63	21	2
Texas	80,000	$3.56	22	2
Colorado	13,715	$2.98	23	1.5
Nebraska	4,348	$2.49	24	1.5
Tennessee	10,937	$1.86	25	1
Ohio	16,195	$1.41	26	0.5
South Carolina	4,920	$1.17	27	0.5
New Mexico	2,000	$1.05	28	0.5
Kentucky	4,146	$1.00	29	0.5
Michigan	8,000	$0.79	30	0.5
North Dakota	465	$0.73	31	0.5
South Dakota	542	$0.70	32	0.5
Arizona	4,000	$0.70	32	0.5
West Virginia	992	$0.55	34	0.5
North Carolina	3,722	$0.44	35	0
Indiana	2,062	$0.33	36	0
Pennsylvania	3,446	$0.28	37	0
Illinois	3,000	$0.24	38	0
Mississippi	497	$0.17	39	0
Missouri	928	$0.16	40	0
Alaska	103	$0.16	40	0
Georgia	1,356	$0.15	42	0
Alabama	438	$0.10	43	0

	2004 Total Spending* ('$1000)	Per Capita Spending	Ranking by Spending per Capita	Score
Oklahoma	316	$0.09	44	0
Arkansas	231	$0.08	45	0
Louisiana	324	$0.07	46	0
Maryland	50	$0.01	47	0
Kansas	0	$0.00	48	0
Virginia	0	$0.00	48	0
Wyoming	0	$0.00	48	0
Delaware	NA	NA	0	NA

*Utility spending is on "ratepayer-funded energy efficiency" programs, or energy efficiency programs funded through charges included in customer utility rates or otherwise paid via some type of charge on customer bills. This includes both utility-administered programs and "public benefits" programs administered by other entities. We do not include data on separately funded low-income programs, load management programs, or energy efficiency research and development.

Figure 1.2. State Ranking by 2004 Energy Efficiency Program Spending per Capita



We also tracked spending on a percent revenues basis; however, we did not factor this into the scoring. The top 15 states are shown in Table 1.3. Note that most states remain in the top fifteen on both per capita and a percent revenues basis.

Leading States

- *Vermont*: Efficiency Vermont (EVT), which began operations in 2000, is the state's provider of energy efficiency services, funded by an "energy efficiency charge" or "EEC" that is included in electric rates on customers' monthly electric bills. Vermont has been spending more than $22.50 per capita and saving close to 2% of its electric needs annually, more than any other state.

Table 1.3. 2004 Utility Spending by State: Total and % Revenues.

	Total Spending ('$1000)	% Revenues
Vermont	14,000	2.2%
Oregon	62,888	2.2%
Massachusetts	133,326	2.2%
Washington	88,522	1.9%
Connecticut	58,098	1.8%
Rhode Island	13,990	1.6%
Minnesota	55,784	1.4%
California	380,009	1.3%
New Hampshire	15,120	1.2%
Utah	16,450	1.2%
New Jersey	92,753	1.2%
Wisconsin	53,734	1.1%
Iowa	28,833	1.1%
Maine	13,118	1.1%
Montana	8,002	1.0%

- *Massachusetts*: Energy efficiency programs in Massachusetts are funded by a monthly system benefits charge (SBC) on customers' electric bills, which is collected by the distribution utilities. In 1997, total funding for system benefits programs was authorized at about $160 million per year. In 2002, total funding was extended through 2007 at about $141 million per year. Per capita spending in 2004 was $20.81.

- *Oregon*: Oregon's restructuring law established a 3% charge on customers' electric bills, called the "public purchase charge," which is administered by the Energy Trust of Oregon. In 2002, the Energy Trust began to deliver energy efficiency programs and spent over $19 million for programs run by utilities and others. In 2004, it spent nearly $63 million, or $17.51 per capita.

CHAPTER 2: ENERGY EFFICIENCY RESOURCE STANDARDS

An Energy Efficiency Resource Standard is a market-based mechanism that encourages energy efficiency by requiring utilities to meet electric and gas energy savings targets. Currently twelve states—Texas, Hawaii, Nevada, Connecticut, California, Vermont, Colorado,[6] Pennsylvania, Washington, Minnesota, Illinois, and New Jersey—have or are in the process of adopting an EERS or similar policy.

[6] The largest utility in Colorado, Xcel Energy, has energy savings goals as part of a settlement agreement.

In the 1970s, many utilities began to offer programs to help customers reduce energy bills, and funding for these programs increased throughout the 1980s and 1990s. As discussed in Chapter 1, following a wave of restructuring activity in the electric industry in the mid-1990s, funding for these programs dropped quickly. As a result, states set up public benefit funds (PBFs), often referred to as a systems benefit charge, to mandate specific levels of funding. Setting targets for levels of spending, however, does not necessarily result in comparable levels of energy savings. An EERS reverses this fundamental policy design feature by mandating a specific level of energy savings.

At the state level, an EERS is generally administered by the state utility commission, as it typically has jurisdiction over investor-owned utilities in the state and in some states it also has jurisdiction over public utilities. Energy savings targets can be met through documented direct program energy efficiency savings and/or through purchasing energy efficiency credits in a market-based trading system. The twelve states that have an EERS or similar policy have each set different levels of savings targets, some more aggressive than others. Some states set a target as a percentage of total electricity sales and others as a percentage of forecast load growth. See Nadel (2006) for a comprehensive review of state EERS targets.

Some states—including Hawaii, Pennsylvania, and Nevada—have adopted EERS-like policies that include both energy efficiency and renewable energy as resources attributable to the overall clean energy targets. These Sustainable Energy Portfolio Standards (SEPS) allow for a broad mix of resources to contribute to the clean energy target and can be adjusted to a state's specific mix of renewable and efficiency resources. Both Hawaii and Nevada originally adopted a Renewable Portfolio Standard (RPS), which creates targets for the procurement of renewable energy, and then updated it to include energy efficiency as an eligible energy resource. A key difference between these states is that Hawaii does not limit the percentage of resources acquired as energy efficiency whereas Nevada limits efficiency to 25% of total resource requirements. In 2004, Pennsylvania passed the Alternative Energy Portfolio Standards Act, which established a two-tiered portfolio standard that acquires "pure" renewables in Tier I, and a mix of energy efficiency and alternative energy in Tier II. See Chapter 3, Combined Heat and Power, for a discussion of the EERS/RPS policies in these three states.

Methodology

We gave a score to the twelve states that have adopted or are in the process of adopting an EERS, based on the current status of implementation of the policy in the state and general strength of the targets. States that have an EERS that is in full operation are given a score of **5**; states that have announced an EERS that is not yet fully effective or do not have binding targets are given a **3**; and states that are in the planning stages earn a score of **1**. All other states earn a score of zero. See Table 2.1 for state scores.

Table 2.1. State Scores for EERS

State	Score	EERS Policy
Texas	5	In 1999, Texas became the first state to establish an EERS. The state's restructuring law created a requirement for electric utilities to offset 10% of load growth through end-use energy efficiency and load management, starting in 2003. In 2005, Texas' investor-owned utilities concluded their third straight year of meeting the goals.
Vermont	5	In 1999, the Vermont Public Service Board (PSB) transferred its energy efficiency operations to Efficiency Vermont, an independent program manager. EVT is contractually required to achieve specific energy and demand goals for the overall Public Benefits Fund program: 84 GWh in 2000–2002; 119 GWh in 2003—2005; and 204 GWh in 2006–2008. By the close of 2005, the portion of Vermont's electrical energy needs being met through verified energy efficiency savings had grown to 4% (Efficiency Vermont 2006). A contract awarded for the 2006–2008 period established an annual savings goal of over 1% of electricity sales each year.
California	5	Each year from 2004 to 2013, IOUs in the state must meet specific energy and demand savings goals, which were developed by the California Energy Commission (CEC). In 2013, the savings goals are 23,183 GWh and 4,885 MW peak. Assuming a 0.8% annual growth rate in electricity sales, electricity savings from efficiency in 2013 represent 8.5% of projected sales in that year, or ten times the forecast load growth in 2013.
Connecticut	5	In June 2005, the Connecticut legislature adopted the Energy Independence Act, which, among other provisions, expanded its Renewable Portfolio Standard to include efficiency. Starting in 2007, the state's IOUs must procure a minimum percent of electricity sales from "Class III" resources by January 1st. Eligible resources include commercial and industrial efficiency and CHP at 1% of load in 2007, 2% in 2008, 3% in 2009, and 4% in 2010 and thereafter.
Colorado	5	By a settlement agreement approved by the PUC, Xcel Energy will make "best efforts" to achieve 320 MW of demand reduction and 800 GWh of electricity savings by 2013 (40 MW and 100 GWh each year) through energy efficiency and load management programs implemented during 2006–2013. Assuming electricity sales grow at an annual rate of 2.5% and the targets are met, the state would save about 1.4% of projected electricity sales in 2013, or 55% of annual load growth in the same year, due to Xcel Energy's electricity savings in its service territory.
Nevada	5	The state's RPS was expanded in 2005 from 15% to 20% of electricity sales, and was amended to include energy efficiency. Energy efficiency can meet up to 25% of the total portfolio standard (renewable energy meets the other 75%). For example, in 2005–2006 the portfolio standard is 6%, and efficiency can meet up to 1.5% of the total load. The overall portfolio increases by 3% every two years, reaching 18% in 2013–2014, and grows to 20% in 2015 and thereafter. Efficiency can meet up to 5% of the total electric load in 2015.

State	Score	EERS Policy
Washington	3	In 2006, a ballot initiative called I-937 was approved by the state's voters. It required utilities to obtain all cost-effective energy efficiency and is expected to result in substantial savings targets for efficiency programs.
Hawaii	3	Under the state's RPS requirements, energy efficiency is allowed to qualify as an eligible resource. The state's IOUs must meet 20% of electricity sales with eligible resources according to the RPS; however, specific energy efficiency requirements are not specified.
Illinois	3	Although not yet implemented with binding targets, the state's Sustainable Energy Plan sets goals as a percentage of forecast load growth for IOUs: 10% in 2006–2008; 15% in 2009–2011; 20% in 2012–2014; and 25% in 2015–2017.
Minnesota	3	In December 2006, Governor Pawlenty announced his Next Generation Energy Initiative, calling for 1.5% annual energy savings of electric and natural gas sales, at least 1% of which must come from energy efficiency.
Pennsylvania	3	Energy efficiency is included as an eligible resource in Tier II of a two-tiered alternative portfolio standard; however, there is no minimum efficiency target. The state's IOUs must meet targets that are given as a percentage of total electricity load: 4.2% in years 1–4; 6.25% in years 5–9; 8.2% in years 10–14; and 10% in years 15 and thereafter.
New Jersey	1	There are two initiatives in New Jersey's program, which is still under development: (1) setting energy and demand goals for the administrator of the Clean Energy Program; and (2) setting savings goals for distribution utilities as a percent of sales. The first initiative includes a four-year total savings target of 1,814 GWh between 2005 and 2008. The second initiative's draft calls for 1% savings per year for a total of 12% in 2016.

Caveats

The energy savings targets, timeframes for achieving the goals or targets, and phase-in rates vary substantially among states' EERS. The more aggressive targets, if met, will therefore achieve higher levels of energy savings, which could have been a measure used to score states in this category. However, because EERS is a relatively recent policy development, state experience and verified energy savings resulting from the policies are somewhat limited. We therefore assign state scores based on the current status of implementation, under the assumption that the longer an EERS or similar policy is in effect, the greater the foundation for achieving energy savings.

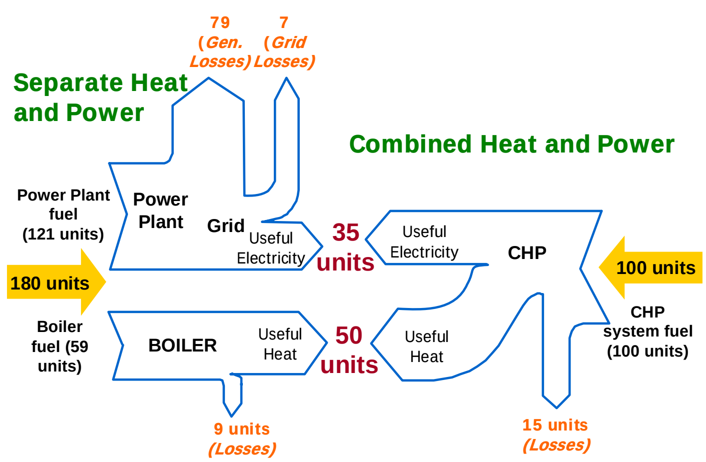
CHAPTER 3: COMBINED HEAT AND POWER

Background

Combined heat and power systems (also known as cogeneration) generate power (usually in the form of electricity) and thermal energy simultaneously from a single fuel source. Unlike central-station power plants, which typically operate at about 33% efficiency and never exceed 50% efficiency,[7] CHP uses heat recovery technologies that capture heat that would otherwise be wasted and use it for heating and cooling purposes, which can increase the system's efficiency to as much as 85% (see Figure 3.1). Barriers created by both the marketplace and electric utilities have hindered the broad implementation of CHP. Actions taken at the state level, however, can help break down these barriers and increase the penetration of CHP systems.

Most CHP systems are used to generate power onsite, close to where it is needed, and therefore greatly decrease a facility's dependence on the electric grid while also reducing the losses that come with bulk transmission of electricity (these losses average about 7% nationally). CHP is one type of distributed generation (DG), which is defined as any technology that produces power off the electric grid (Shipley and Elliott 2000). Increasing pressure on our electric system in the U.S., which received attention recently with the August 2003 Midwest and Northeast blackout and the 2006 summer heat waves, underscores the significance of distributed CHP systems that can reduce demand on the electric grid and thus enhance electric system reliability. CHP systems are often used at large industrial or institutional facilities, such as pulp and paper mills or colleges and universities, due to the significant electric and thermal needs at these locations. CHP systems are also used by sites with critical power needs (e.g., biopharmaceutical/research, high tech, or essential life/safety services such as hospitals, prisons, and military bases). While many recent installations have used natural gas as their fuel, several other fuel types (including biomass, landfill gas, and municipal waste) are also being used in CHP systems, making it an extremely versatile, clean energy resource.

Figure 3.1. Comparison of Typical Power Plant with a CHP System



Source: Elliott and Hedman (2001)

[7] For example, a combined cycle gas turbine (CCGT) plant can reach up to 50% efficiency when measuring efficiency on a high heating value (HHV) basis.

There are several barriers impeding more widespread use of CHP systems in the U.S. These include:

- *Utility Practices***.** Utility standby rates and tariffs are a crucial element in determining the cost-effectiveness of a CHP system, and are the greatest barrier to increased CHP. High standby rates often make installations uneconomical. Also, customers often must fill out lengthy and complex applications with the incumbent utility to connect a CHP system to the electric power grid. Standard interconnection rules established at the state level help streamline the interconnection process. Currently, 18 states have adopted these rules, which mostly apply to investor-owned utilities. In other states and for many municipal and public utilities, the interconnection procedures are largely set by utilities. Another utility practice that hinders CHP development is that it is often not viewed as a utility resource. CHP systems can, in fact, benefit utilities by reducing demand and enhancing grid reliability. However, utility planning does not identify the best locations for CHP systems and does not reward those sites. For a detailed review of utility policies toward CHP, see Brooks, Eldridge, and Elliott (2006).
- *Spark Spread***.** In the late 1990s, CHP systems that used natural gas as a fuel source often had the advantage of generating electricity cheaper than it can be purchased from utilities due to relatively low natural gas prices compared to electricity prices. Spark spread refers to the difference in the cost to generate electricity from a fuel source such as natural gas and the cost to purchase it from the utility. Recent high gas prices have made electricity from natural-gas-fueled CHP systems appear uneconomical. However, rising electric rates in some areas of the country still provide favorable spark spread. In a recent review of utility CHP policies, utility employees often cited economic reasons such as high natural gas prices as the main deterrent to installing CHP systems (Brooks, Eldridge, and Elliott 2006).
- *Tax Treatment***.** The most underdeveloped and yet promising market for CHP lies in medium and smaller projects less than 25 MW. These projects often have transaction costs as high as larger projects, and many would require fair tax treatment that offsets these additional costs in order to be viable. State-level incentives that have been seen in New York and California would help boost this market.
- *Customer Readiness***.** When installing a CHP system, customers are often challenged with high upfront costs, system sizing complications, and the uncertainty in how to deal with a commercial relationship with the power market. These issues create hesitation on the part of the customer to sign on to such a project.
- *Emission Standards***.** Traditionally, boilers and power generators have been regulated on an input basis. This approach relies on the application of pollution control devices to reduce emissions and does not explicitly recognize the efficiency of the process in converting fuel input into a useful output. As such, input-based regulations do not encourage pollution reductions through efficiency.

State Policies and Programs

Although federal action remains important for the development of CHP, there is a great need for states to take action to implement policies encouraging it, particularly since utility practices generally fall under state authority and not federal. Because many smaller CHP systems interconnect at the retail level, federal jurisdiction over these interconnections is limited. Rather, it is state legislatures, energy offices, and public utility commissions that oversee connection to the distribution grid and power production, and are therefore in a position to regulate distributed generation in such a way that promotes CHP.

There are several policy measures at the state level that have been implemented in several states and are vital to the success of CHP. These include:

- Streamlined standard interconnection rules for distributed generation, including CHP;
- Financial incentives (grants, tax incentives, low-interest loans, and rebates);
- RPS or EERS that include CHP as an eligible technology; and
- Output-based regulations in emission standards and output-based allocations of emissions allowances within a cap-and-trade program.

Methodology

We scored states based on whether they have adopted the four above-mentioned policies that promote the development of CHP systems: standard interconnection rules; presence of CHP incentive programs; inclusion of CHP/waste heat recovery in a state RPS or EERS; and output-based emissions regulations. Although very important to the success of CHP, we chose not to score states based on tariffs and standby rates because they are developed by individual utilities rather than state agencies.

The Database of State Incentives for Renewable Energy (DSIRE 2006), maintained by North Carolina State University, served as a main source for state rules, regulations, and incentives for CHP. The EPA's Combined Heat and Power Partnership Web site, which includes a database of state rules, regulations, and funding opportunities for CHP, was a very useful source of information on state standard interconnection rules, CHP incentives, and state RPS/EERS status (EPA 2006a, b, c).[8]

Based on the subset of policies discussed above that address CHP barriers, ACEEE staff assigned state scores, which were then sent to several CHP experts for review. Some changes were made based on reviewers' comments.

Table 3.1 displays our state scorecard on CHP policies. We gave each state a score of zero to five based on the following general criteria (with some modifications according to expert judgment):

- Because we view standard interconnection rules as one of the best state policy indicators of friendliness to CHP, we largely based our scoring system on the adoption of this policy: all states with interconnection rules that include CHP were given a score of at least **3**; states with exemplary interconnection policies were given

[8] EPA's funding opportunities database is updated twice a month to ensure that only current and future opportunities are shown on the Web site. Past opportunities are not listed; as such, the information on CHP was current as of September 2006.

a score of at least **4**; and states with a proposed interconnection standard were given a score of at least **2**.

- States that we determined to be leading the way on the broad implementation of CHP, based on our professional judgment, were given a score of **5**.
- States that have adopted at least one policy were given a score of **1**.
- States that have adopted none of the four policies reviewed here were given a score of **0**.

Caveats

Our state scorecard on CHP provides an overall, qualitative snapshot of what policies have been implemented in what states. For a detailed tool to assess a range of different policy parameters relevant to the deployment of distributed generation resources, see the Regulatory Assistance Project's (RAP) Distributed Generation Policy Scoring Tool.[9]

A major caveat to our scoring of state CHP is that it does not take into account standby rates, which can be either a significant contributor or inhibitor to the success of a CHP project, depending on how friendly they are toward distributed generation. However, it is important to note that standby rates are not determined by state agencies, but rather by individual utilities. See Brooks, Eldridge, and Elliott (2006) for a review of utility policies toward CHP. Although important to the success of CHP, standby rates are therefore outside the realm of a state scorecard.

Standard Interconnection Rules

Statewide standard interconnection rules, which address the application process and the technical requirements for interconnecting DG projects of a specified size with the electric grid, are an important policy tool that helps to streamline the process for CHP/DG projects to interconnect with the grid. There are currently no uniform standards for interconnection in the U.S., making action at the state level crucial to the development of consistent interconnection procedures. Even within states, a number of utility systems, municipal utilities, and rural cooperatives are beyond the reach of state utility commissions and are left to adopt their own standards. Still, statewide interconnection rules create uniformity that makes the process more desirable for CHP customers. Generally developed by a state's public utility commission (though on occasion adopted by legislation), interconnection rules establish uniform processes and technical requirements for distributed generation projects to interconnect to the electric grid. Interconnection rules typically address application forms, timelines, fees, insurance requirements, and interconnection agreements. As of December 2006, 19 states have adopted standard interconnection rules for DG and an additional 14 states have proposed rules (see Table 3.1) (EPA 2007a).

[9] See http://www.raponline.org/Feature.asp?select=83&Submit1=Submit

Table 3.1. State Scoring for CHP

States	Standard Interconnection Rule that Includes CHP?[a, *]	Output-Based Emissions Regulations[b]	State CHP Financial Incentives[c]	CHP Included in State RPS/EERS[d]	Score
California	●●	●	●		5
New Jersey	●●	●	●		5
New York	●●	●	●		5
Connecticut	●●	●	●	●	5
Massachusetts	●●	●			4
Oregon	●^		●		4
Pennsylvania	●		●	●	4
Texas	●●	●			4
Colorado	●				3
Delaware	●	●			3
Hawaii	●			●	3
Indiana	●	●	●		3
Michigan	●		●		3
Minnesota	●●		●		3
New Mexico	●		●		3
Ohio	●	●	●		3
Vermont	●^		●		3
Washington	●^**			●^	3
Wisconsin	●●		●		3
Maryland	●^	●			3
Virginia	●^				2
Arizona	●^				2
Kansas	●		●		2
Illinois	●^		●		2
Idaho	●^		●		2
Iowa	●^				2
North Carolina	●^		●		2
Maine		●		●	2
Alaska			●		2
Nevada				●	2
South Carolina	●^		●		2
West Virginia	●^				2
Wyoming	●^				2
South Dakota	●^				2
Utah	●^				2
Alabama			●		1
Mississippi			●		1
Nebraska			●		1
Rhode Island					1
Tennessee			●		1
New Hampshire		●	●		1
Arkansas					0
District of Columbia					0

States	Standard Interconnection Rule that Includes CHP?[a, *]	Output-Based Emissions Regulations[b]	State CHP Financial Incentives[c]	CHP Included in State RPS/EERS[d]	Score
Florida					0
Georgia					0
Kentucky					0
Louisiana					0
Missouri					0
Montana					0
North Dakota					0
Oklahoma					0

[a] Sources: EPA (2007a); DSIRE (2006)
[b] Source: EPA (2006a)
[c] Source: EPA (2006b)
[d] Source: EPA (2006c)

* ● = Statewide standard interconnection rules exist that include CHP as an eligible technology; ●^ = Standard interconnection rules are proposed. ●●= Exemplary standard interconnection rules that include CHP.
** In March 2006, the Washington Utilities and Transportation Commission (WUTC) adopted interconnection standards for all DG up to 25 kW in capacity. The WUTC is currently developing standards for DG over 25 kW.

In addition to those states that have adopted interconnection rules for DG, another 12 states have adopted interconnection rules for renewable projects, such as small-scale PV and wind systems. These rules are often tied to net-metering legislation and represent an important first step toward enacting statewide interconnection rules that include all forms of distributed generation. We do not, however, include these state policies as points toward a score on CHP. For a state-by-state review of net-metering rules, see *Freeing the Grid* (NNEC 2006).

Although there are currently no mandatory uniform national standards for interconnection for retail DG, there have been voluntary technical standards developed by the Institute of Electrical and Electronics Engineers (IEEE) and the Underwriters Laboratory (UL). Under the federal *Energy Policy Act of 2005*, Sec. 1254 regarding Interconnection Requirements, utilities and states are required to consider adopting IEEE 1547 as a technical standard for interconnection. This standard does not, however, address application procedures and interconnection agreements, which can represent much of the barrier. Under Sec. 1254, states and utilities are also required to consider agreements and procedures based on best practices and model codes.

Not all interconnection standards are "created equal." Among other things, they vary in size limitations, eligible technologies, and additional insurance and external disconnect requirements. Consistency among state policies becomes challenging, making regional models for interconnection guidelines highly effective. For example, the Mid-Atlantic Regional Distributed Resources Initiative (MADRI),[10] created in 2004 by the region's public

[10] MADRI entities are Delaware, District of Columbia, Maryland, New Jersey, and Pennsylvania. Rather than focusing on individual state programs, MADRI takes a regional approach to educate stakeholders on distributed resource (DR) opportunities, barriers, and solutions; develop alternative DR solutions; and pursue regional consensus on preferred solution. See http://www.energetics.com/madri/

utility commissioners, developed *Model Interconnection Procedures* that were agreed to by the four MADRI states plus D.C. in 2005 and were recently used to develop interconnection standards in Pennsylvania. Procedures are currently being developed in the other states and D.C. The MADRI model was also used as the starting point for the process in Oregon to develop interconnection standards.

Leading States

- *Texas.* The Public Utility Commission of Texas (PUCT) adopted standard interconnection rules in 1999,[11] making Texas the first state to develop interconnection standards for distributed generation (DSIRE 2006). The rules apply to interconnecting distributed generating facilities of 10 MW or less.[12]

- *New York*. In 1999, New York became the second state to adopt uniform interconnection standards for distributed generation systems, which included systems to 300 kW in capacity. Due to burdensome procedural issues, the PSC adopted modifications to the technical guidelines in November 2002 to streamline the application process. In 2004, the maximum capacity of interconnected systems was increased from 300 kW to 2 MW and interconnections were expanded to the state's more complex distribution systems, or "network" systems, which exist in large, urban areas (including New York City).

- *Massachusetts*. In 2002, the Massachusetts Department of Telecommunications and Energy (DTE) initiated a rulemaking to develop interconnection standards for DG. A DG Collaborative was established to engage stakeholders (including utilities, DG developers, customers, and public interest organizations) to jointly develop a Model Interconnection Tariff, which established a clear, transparent, and standard process for DG interconnection applications. In December 2005, DTE issued a final order, which approved a "Revised Model Distributed Generation Interconnection Standards and Procedures Tariff."[13]

Renewable Portfolio Standards and Energy Efficiency Resource Standards

State Renewable Portfolio Standards and Energy Efficiency Resource Standards require that electric utilities and other retail electric providers fill a minimum amount of resource needs from eligible clean energy and energy efficiency technologies. Currently twenty-one states and the District of Columbia have some form of a RPS or EERS, all of which vary in their target specifications, date by which the target must be met, and eligible fuels and resources (see Nadel 2006 for a detailed review of state EERS and UCS 2006a for a review of state RPS). Several states have adopted combined efficiency/renewable/"advanced" energy portfolio standards (Nevada, Hawaii, and Pennsylvania) (Nadel 2006). Under the rules of all

[11] See Substantive Rules §25.211 and §25.212.
[12] For a detailed description of Texas' interconnection standards, see its *Distributed Generation Interconnection Manual*, available at http://www.puc.state.tx.us/electric/business/dg/dgmanual.pdf.
[13] DTE Order 02-38-C. December 27, 2005. http://masstech.org/renewableenergy/public_policy/DG/resources/02-38-C_DTE-order.pdf.

22 states with an RPS, biomass/biogas electricity generation qualifies, including those that are CHP systems; however, thermal generation does not qualify in all cases. Only six states include CHP/cogeneration specifically as an eligible technology for its RPS or EERS requirement. These states are Connecticut, Hawaii, Maine, Nevada, Pennsylvania, and Washington (EPA 2006a). Arizona's portfolio standard specifically includes renewable CHP.

Leading States

- *Hawaii.* Senate Bill 2474[14] was signed in 2004, expanding the state's RPS (originally established in 2001) to include energy efficiency (and CHP) and expanding it through 2020. The state's utilities must serve at least 8% of its customer load through clean energy and energy efficiency technologies by 2005, rising gradually to 20% by 2020 (UCS 2006a). In 2004, renewable energy and energy efficiency accounted for about 11% of electricity sales, satisfying the targets. Projected load growth, however, may make it difficult to meet the 2020 targets without increasing eligible technology efforts (Nadel 2006). The regulations, in reference to CHP, state that "use of rejected heat from co-generation and combined heat and power systems excluding fossil-fueled qualifying facilities that sell electricity to electric utility companies and central power projects" are considered eligible generators.

- *Connecticut.* In July 2005, legislation was passed establishing "Class III" eligible resources under Connecticut's EERS/RPS (see Chapter 2).[15] Eligible CHP systems must be developed on or after January 1, 2006. Existing units that have been modified on or after 2006 can earn credits only for the incremental output gains. A CHP system must meet a total efficiency level of at least 50%. The sum of all useful electrical energy output must comprise at least 20% of the technology's total usable energy output. The sum of all thermal energy products must also constitute at least 20% of the technology's usable energy output. In the final docket decision it was determined that upon initial certification, annual fuel conversion efficiency and percentages of production will be assessed quarterly for the next year. After this duration, compliance with the efficiency requirements must be shown each quarter to qualify for renewable energy credits.

- *Pennsylvania*. Effective February 2005, the Alternative Energy Portfolio Standard (AEPS) requires load-serving energy companies in the state to provide 10% of their electricity from Tier II alternative energy sources by 2020. Among others, Tier II sources include CHP/cogeneration, demand-side management, large-scale hydro, municipal solid waste, pulping process and wood-manufacturing byproducts, and integrated combined coal gasification (ICCG) technology.[16]

[14] See http://www.capitol.hawaii.gov/session2004/Bills/SB2474_HD1_.htm.

[15] "Class III" renewable energy source means the electricity output from combined heat and power systems with an operating efficiency level of no less than 50% that are part of customer side distributed resources developed at commercial and industrial facilities in this state on or after January 1, 2006, or the electricity savings created at commercial and industrial facilities in this state from conservation and load management programs begun on or after January 1, 2006.

[16] See 73 P.S. § 1648.2 for detailed definitions of eligible alternative energy sources: http://www.dsireusa.org/documents/Incentives/PA06Rb.htm.

Incentives

Providing incentives for CHP projects is a useful tool to encourage investment in clean energy technologies. Agencies at the state level, including state energy offices, public utility commissions, and state legislatures are in a good position to foster such financial incentives. These incentives can come in the form of rebates, grants, taxes, and loans. According to EPA's Combined Heat and Power partnership database, 23 states currently offer some type of financial incentive that can be applied to CHP (EPA 2006b). These funding opportunities vary considerably in scope, but each is important to successfully encourage CHP and together they are mutually reinforcing. A register of which states have adopted which policies is shown in Table 3.1. We highlight several of the CHP incentive programs below.

Leading States

- *California*. In 2001, the California Public Utilities Commission (CPUC) ordered the state's investor-owned utilities to work with it and the California Energy Commission to develop and implement a self-generation equipment incentive program.[17] Currently extended through 2007, California's Self-Generation Incentive Program (SGIP) provides rebates for electric utility customers who install clean distributed generation.[18] Pacific Gas & Electric (PG&E), Southern California Edison (SCE), and SoCal Gas are the program administrators in their service territories, and the San Diego Regional Energy Office administers the program in San Diego Gas and Electric's service territory.

- *New York*. Over the last seven years, the New York State Research and Development Authority's (NYSERDA) Distributed Generation and Combined Heat and Power (DG-CHP) program has had two specific objectives: to demonstrate examples of innovative applications of clean, efficient, commercially available, and emerging CHP systems in a wide array of end-use sectors;[19] and to sponsor the development of improved generator and power system component technologies. Almost 100 demonstration projects, representing over $55 million of NYSERDA funding, have been selected through annual competitions. Additionally, $22 million of NYSERDA funding has been invested in nearly 70 projects for power system technologies development. These program objectives will continue with slight modifications in the future, and will be complemented by additional funding sources and additional objectives. Collectively, covering the last seven years, these programs have invested over $94 million of NYSERDA funding, of which $72 million has been allocated to get permanent DG-CHP equipment installed in the field (which, when fully installed, will have a capacity of 192 MW). For 2007, collectively these programs will offer over $40 million of NYSERDA funding to get permanent DG-CHP equipment installed in the field. Part of the program is the Commercial and Industrial Performance Program (CIPP), which promotes energy efficiency and CHP through

[17] Assembly Bill 970 (AB 970).
[18] See http://www.pge.com/docs/pdfs/suppliers_purchasing/new_generator/incentive/2006_SGIP_Handook-r0-060127.pdf for the rebate guidelines.
[19] See performance data at http://chp.nyserda.org

financial grants. About 100 DG-CHP systems have been approved for funding, representing 100 MW of peak demand reduction (Levy 2007).

- *New Jersey*. The New Jersey Clean Energy Program, administered by the New Jersey Board of Public Utilities (BPU), provides incentives to qualifying customers, contractors, and energy service companies to purchase and install various types of CHP units. The program received solicitations in 2004, 2005, and 2006. The 2004 CHP Program funded a total of 23 projects that will generate in excess of 8 MW of power with system efficiencies of 60% or greater (EPA 2006d). Ten projects received a total of $7.4 million in funding in 2005 (EPA 2005).

Output-Based Emissions Regulations

Traditionally, environmental regulations on boilers and power generators have been established on an input basis. This approach relies on the application of pollution control devices to reduce emissions and does not explicitly recognize the efficiency of the process in converting fuel input into a useful output. As such, input-based regulations do not encourage pollution reductions through efficiency. Output-based emission limits, however, encourages fuel conversion efficiency. These are important for promoting the significant energy and environmental benefits of CHP.

Leading States (EPA 2006a)

- *Connecticut.* Connecticut has promulgated an output-based regulation for NO_x, particulate matter, CO, and CO_2 from small DG (< 15 MW capacity), including CHP. Connecticut's regulation values the efficiency of CHP based on the emissions that are avoided by not having separate electric and thermal generation. Connecticut also allocates allowances based on energy output in their NO_x trading program.

- *Indiana.* The state's NO_x trading program includes a set-aside of allowance allocations for energy efficiency and renewable energy. Indiana allocates 1,103 tons of NO_x allowances each year for projects that reduce the consumption of electricity, reduce the consumption of energy other than electricity, or generate electricity using renewable energy. Eligible projects can involve combined cycle systems, CHP, microturbines, or fuel cells.

- *Texas.* In 2001, the state promulgated a standard permit with output-based emission limits for small electric generators. The permit sets different NO_x limits (lb/MWh) based on facility size, location, and level of utilization. The compliance calculation accounts for the thermal output of CHP units by converting the measured steam output (Btu) to an equivalent electrical output (MWh).

Other State CHP Policies and Indicators

1. *Standby and backup rates.* Utility standby rates are one example of utility polices that are crucial in determining whether a CHP project will be cost-effective, making the implementation of reasonable standby rates by utilities essential to the long-term success of CHP. New York, for example, adopted new standby rates in 2003 and is investigating the reasonableness of rates, terms, and conditions for the provision of electric standby service.[20] Small CHP systems (less than 1 MW) and other environmentally beneficial technologies are eligible and can choose among three rate options. California passed Senate Bill 1-28 in 2001, which promoted the installation of DG. The bill has provisions requiring interim exemptions from standby charges until long-term tariffs are established in the state. CHP systems installed by June 2004 are eligible for the exemption through 2011 (EPA 2005). In 2004, the Oregon Public Utilities Commission approved a settlement regarding Portland General Electric Company's (PGE) tariffs for partial requirements customers. The load served by the onsite generation is treated in the same manner as any other load on the system, which under Oregon rules is obligated to have (or contract for) its share of contingency reserves. Under the new rates, the partial requirements customer must pay or contract for contingency reserves equal to 7% of the "reserve capacity."

2. *Leadership and collaboration.* Forums that bring together utilities, CHP experts, and state energy officials can help fuel discussion and collaboration. State leadership that drives such collaboration and tracks and secures progress can significantly benefit the development of CHP.

3. *Installed capacity.* Best estimates are that a total of about 83,300 MW of CHP capacity is currently installed in the U.S. (Hampson and Hedman 2006). The potential for CHP varies widely among states and therefore current installed capacity is not necessarily an indicator of state policy effectiveness. However, it is important to track the current trends in development. States should make an effort to track all DG, including CHP, in a state registry for planning and policy purposes.

CHAPTER 4: BUILDING ENERGY CODES

Background

Building energy consumption accounts for nearly 40% of total energy use and greenhouse gas emissions in the U.S. and 65% of total U.S. electricity consumption, making buildings an essential target for energy savings. Because buildings have long lifetimes and are not easily retrofitted, it is crucial to target building efficiency measures prior to construction. Mandatory building energy codes are one way to target energy efficiency by requiring a minimum level of energy efficiency for residential and commercial buildings.

[20] See http://www.dps.state.ny.us/index.html, reference Case No. 02-E-0780 and Case No. 02-E-0781.

There are several obstacles that limit energy efficiency potential in the buildings sector. These include:

- ***New construction "lost opportunities."*** Most new buildings in the U.S. are not commissioned at the time of design and construction and therefore do not build in efficiency measures. Moreover, retrofitting a building to incorporate certain energy efficiency measures often comes at a high cost, and therefore new buildings, which have long lifetimes, are referred to as "lost opportunities." Efficiency is best incorporated at the time of construction.
- ***Split-incentives.*** This is a classic example of the "principal-agent" barrier. While homeowners and tenants (principals) see the benefits of energy efficiency measures in lower energy bills, builders (agents) typically bear the capital cost of energy efficiency improvements. Builders who are not commissioned by mandate or by incentive to incorporate efficiency measures do not have the incentive to invest in efficiency features.
- ***Size and fragmentation of the building industry.*** The U.S. building industry epitomizes the classic "information-cost" market barrier. There are approximately 150,000 home building companies in the U.S., making it costly if not impossible to get "perfect information" on efficiency options to all actors. Unlike most sectors of the U.S. economy, which are highly automated, building construction depends on the integration of hundreds of components from various manufacturers and subcontractors. This fragmentation of the industry limits the optimization of building design and performance because the various components are rarely designed to work as a system (Prindle et al. 2003).

In 1978, California enacted the first statewide building energy code in its Title 24 Building Standard. Florida, New York, Minnesota, Oregon, and Washington followed with state-developed codes in the 1980s. During the 1980s, the Council of American Building Officials (CABO) developed its Model Energy Code (MEC), versions of which are still being used today in some states. CABO evolved into the International Code Council (ICC) during the 1990s, while the MEC was renamed the International Energy Conservation Code (IECC). Today, most states use a version of the MEC or IECC for its residential building code. It requires a minimum level of energy efficiency in new residential construction, with major provisions including building envelope requirements[21] and duct sealing and insulation. Most commercial building codes are based on ASHRAE 90.1, jointly developed by the American Society of Heating, Refrigerating and Air-Conditioning (ASHRAE) and the Illuminating Engineering Society (IES). The IECC also includes prescriptive and performance commercial building provisions.

Voluntary programs are also an effective strategy to increase energy savings measures in buildings. For example, EPA's ENERGY STAR Homes program, which requires about 15% savings relative to current model energy codes,[22] and DOE's Building America Program,

[21] The building envelope consists of ceilings, walls, windows, floors, and foundations. The building envelope requirements set insulation levels, window u-factors, and solar heat gain coefficients.
[22] ENERGY STAR-qualified homes are at least 15% more efficient than homes built to the 2004 International Residential Code (IRC) (ENERGY STAR 2006).

which aims for 50% energy savings, have encouraged the construction of more efficient homes. The New Buildings Institute's (NBI) "Getting to Fifty" Web site provides resources to help designers, architects, owners, and contractors reach 50% better-than-code advanced buildings (NBI 2006). The Energy Policy Act (EPAct) of 2005 included federal tax credits for new homes and commercial buildings that reduce energy use 50% relative to model codes.[23] Voluntary programs complement mandatory codes by setting more advanced building performance levels, thus "raising the bar" in energy savings and opening the door to future building code improvements.

Status of State Energy Codes

As of December 2006, 39 states and the District of Columbia have mandatory building energy codes (see Table 4.1). Most states use a version of the MEC or IECC for residential buildings and the ASHRAE 90.1 or IECC for commercial building codes. Several states have developed their own energy code, including California, Florida, Massachusetts, Minnesota, Oregon, and Washington. The most recent version of the IECC was published in 2006 and has already been adopted for residential and commercial buildings in Iowa and Alaska and for residential buildings only in Louisiana. The code will likely be adopted soon in New Jersey, South Carolina, Ohio, and Pennsylvania, and is being considered in several other states.[24]

Energy codes are typically adopted at the state level, but are enforced at the local level by municipal or county code officials. Some "home rule" states have legal structures that prevent the state government from imposing building codes without special legislation.

Methodology

Our review of state building energy codes is based largely on information provided by the Building Codes Assistance Project, which maintains maps and state overviews of building energy codes (BCAP 2006). We assign each state a score of zero to five for residential and commercial building energy codes, with five being assigned to the most stringent codes (see Table 4.2). In some cases, we adjust state scores based on adoption of key standards, such as the Texas code with standards for low solar gain windows.

[23] A credit of $2,000 is available to home builders who build homes projected to save at least 50% of the heating and cooling energy of a comparable home that meets the standards of the 2003 IECC. A $1,000 credit is available to manufactured home producers for models that save 30% or that qualify for the federal ENERGY STAR Homes program. These credits are available for buildings or systems placed in service from January 1, 2006, through December 31, 2007 (TIAP 2006).

[24] See BCAP's newsletter and map and state overviews: http://www.bcap-energy.org/home.php (BCAP 2006).

Table 4.1. State Scoring on Building Energy Codes

States	Residential State Energy Codes	Commercial State Energy Codes	Score (average)
California	5	5	5
Washington	4	4	4
West Virginia	4	4	4
Virginia	4	4	4
Utah	4	4	4
South Carolina	4	4	4
Rhode Island	4	4	4
Pennsylvania	4	4	4
Oregon	4	4	4
Ohio	4	4	4
New Mexico	4	4	4
Nevada	4	4	4
Nebraska	4	4	4
Montana	4	4	4
Maryland	4	4	4
Kansas	4	4	4
Iowa	4	4	4
Idaho	4	4	4
Georgia	4	4	4
Florida	4	4	4
District of Columbia	4	4	4
Connecticut	4	4	4
Texas	4	4	4
Minnesota	4	4	4
Louisiana	4	3	3.5
North Carolina	3	4	3.5
Kentucky	3	4	3.5
Arkansas	3	3	3
Wisconsin	3	3	3
Vermont	3	3	3
New York	3	3	3
New Hampshire	3	3	3
Delaware	3	3	3
Illinois	3	3	3
Colorado	3	3	3
Arizona	3	3	3
Oklahoma	3	2	2.5
New Jersey	2	3	2.5
Massachusetts	2	3	2.5
Maine	0	4	2
Indiana	2	2	2
Alaska	4	0	2
Hawaii	2	2	2
Missouri	0	3	1.5
Michigan	1	1	1

States	Residential State Energy Codes	Commercial State Energy Codes	Score (average)
Tennessee	2	0	1
Wyoming	0	0	0
South Dakota	0	0	0
North Dakota	0	0	0
Mississippi	0	0	0
Alabama	0	0	0

Source: Derived from BCAP (2006), as of December 2006

Table 4.2. Scoring Methodology for Residential and Commercial Building Energy Codes

Score	Residential Building Code	Commercial Building Code
Five	Exceeds IECC 2003-2006 or equivalent	Exceeds 2003-2006 IECC or ASHRAE 90.1-2001/2004 or equivalent
Four	IECC 2003-2006 or equivalent	IECC 2003-2006 or ASHRAE 90.1-2001/2004 or equivalent
Three	1998-2001 IECC (meets EPCA[25]); no mandatory state energy code, but significant adoptions of 2003 IECC in jurisdictions	1998-2001 IECC or ASHRAE 90.1-1999 or equivalent; no mandatory state energy code, but significant adoptions of 2003 IECC in jurisdictions
Two	Precedes 1998 IECC (does not meet EPCA)	Precedes ASHRAE 90.1-1999 or equivalent (does not meet EPCA)
Zero	No mandatory state energy code	No mandatory state energy code

California earns a score of five because its own, state-developed code is considered to be more stringent than the highest IECC standards. States that have not adopted a mandatory state energy code earn a score of zero. Currently, nine states have no mandatory statewide energy codes for either residential or commercial buildings. These states include Alabama, Arizona, Colorado, Hawaii, Mississippi, Missouri, North Dakota, South Dakota, and Wyoming. Of these states, Arizona, Colorado, Illinois, and Missouri have no statewide codes, but do have significant adoptions of 2003 IECC building energy codes in local jurisdictions and are given a score of three.

Caveats

One limitation to scoring states based on current levels of building energy codes is that compliance may vary among states. Similarly, code inspectors and builders/designers need technical training and support to enforce compliance, which can vary among states. Some states have less than one full-time-equivalent staff person dedicated to enforcement, others rely on self-enforcement mechanisms such as home energy rating systems and the ENERGY STAR program, and many states simply do not pursue monitoring and evaluation (EPA

[25] Under the federal Energy and Production Act, states are required to review and adopt the MEC/IECC and the most recent version of ASHRAE Standard 90.1 for which DOE has made a positive determination for energy savings (currently 90.1-1999) or submit to the Secretary of Energy its reason for not doing so.

2006d). Although beyond the scope of this project, future versions of the *Scorecard* could evaluate these criteria for building codes.

Leading States

- *California.* California's state-developed energy code (Title 24 standards) is generally considered to be the most stringent and best enforced energy code in the U.S. Over the last 30 years, annual electricity use per person in California has remained steady at 7,000 kWh. Over the same time period, the same number for Americans rose from 8,000 kWh to 12,000 kWh (Rosenfeld 2003). The state attributes 25% of the electricity savings to the Title 24 standards. California's Title 24 stands out because it is stringent, has high compliance rates in field verification studies, offers flexibility through performance-based specifications, and is actively supported through technical assistance.

- *Washington.* Building energy efficiency codes in Washington emerged from the Model Conservation Standards (MCS) developed in the Northwest in the 1980s and takes a more prescriptive approach than California's Title 24. The Washington State Energy Code (most recent version is the 2004 Edition)[26] has achieved a high level of compliance, with a recent construction practice survey suggesting that 94% of homes meet or exceed the code requirements for the building envelope (Prindle et al. 2003).

- *Texas.* In 2001, Texas adopted the Texas Building Energy standards to help meet federal Clean Air Act requirements. The standards require local governments to follow one statewide building code, the IECC 2000 with a 2001 Supplement. The new code mandates new and replacement windows to have a Solar Heat Gain Coefficient (SHGC) of 0.40 or less in most of the state.[27] Solar gain is the largest contributor to cooling loads, and reducing solar gain means reducing air conditioning loads by as much as 30% during the summer ozone season (DOE 2005).

Chapter 5: Transportation

The transportation sector accounts for about 28% of total U.S. energy use and 70% of U.S. petroleum consumption (EIA 2006b). Forecasts estimate that petroleum consumption will increase at an average annual rate of about 1.1% between 2004 and 2030 and that light-duty vehicles will continue to dominate energy consumption in the transportation sector, with its total consumption growing from 28 Quads in 2004 to 40 Quads in 2030 (EIA 2006c).[28]

In 1987, the average fuel economy of light-duty vehicles peaked at 22.1 MPG and has actually declined to 20.5 MPG in 2004, according to data from EPA. Rated Corporate Average Fuel Economy (CAFE) values tend to be higher, closer to 26 MPG in 1987 and 25

[26] For a copy of the code, see http://apps.leg.wa.gov/WAC/default.aspx?cite=51-11.
[27] Prior to the new code adoption, typical practice in the state was to use windows with a SHGC of 0.73 or less (DOE 2005).
[28] A "Quad" is a unit of energy equal to one quadrillion British thermal units (Btus). The U.S. currently consumes about 100 Quads annually (EIA 2006b).

MPG in 2004, because fuel economy test procedures tend to overstate fuel economy performance. By either measure, it is clear that U.S. vehicles have not made progress on fuel economy in the last 20 years. Increasing vehicle size, weight, power, and acceleration have more than offset efficiency gains. Despite the apparent trend in declining fuel economy over the years, there are significant opportunities to increase energy efficiency and reduce GHG emissions and oil dependence by increasing vehicle fuel economy.

Further aggravating the increase in light-duty fuel consumption over the years is the growing sprawl evidenced in metropolitan area development in the U.S., and as a result, an increase in the total vehicle miles traveled (VMT). People that live in sprawling metropolitan areas tend to drive greater distances, own more cars, and walk and use mass transit less (SGA 2002). In 2004, nearly 80% of commuters drove alone to work and only 5% used public transportation. Total VMT increased by 26% in the U.S between 1993 and 2003 (BTS 2005a), which is twice the growth rate of the U.S. population in the same time period (U.S. Census Bureau 2005).

The 1991 landmark federal Intermodal Surface Transportation Efficiency Act (ISTEA) sparked transportation reform to move beyond interstate transportation development, creating programs oriented toward community planning and making it possible for communities to use federal dollars on a broader range of transportation investments (STPP 2006). State transportation departments, transit agencies, and to a lesser extent, regional groups called Metropolitan Planning Organizations (MPOs) and the U.S. government are the key players to plan and fund mainstream transportation. However, local governments make most land use decisions, making it important for state governments to work collaboratively across multiple levels of government to effect “smart” transportation and land use policies.

Because the federal government controls the regulation of vehicle fuel economy and research and development initiatives, states are pursuing other measures that will increase energy efficiency in the transportation sector. Today, state policy initiatives such as tailpipe emission standards, tax incentives for fuel-efficient vehicles, state fleet requirements, and smart growth land use planning are being pursued in several states.

State Policies and Programs

There are several policies that states are now pursuing that will help raise fuel economy and reduce VMT:

- Tailpipe emissions standards (based on California regulations that restrict greenhouse gases in automobile exhaust);
- Land use policies that incorporate principles of smart growth and smart transportation and reduce total vehicle miles traveled;
- State transit funding;
- State fleet procurement requirements;
- Tolling and other pricing policies; and
- Financial incentives (tax credits and exemptions, grants, loans, and rebates).

Methodology

We score states based on the adoption of policy initiatives that encourage transportation efficiency (see Table 5.1). The policy score is based on a review of which states have adopted four of the above-mentioned policies: California's tailpipe emissions standards, exemplary land use policies, transit funding, and state fleet requirements. See Chapter 7 for a review of states that offer tax incentives for fuel-efficient hybrid-electric vehicles (HEVs). State fleet policies were based on a forthcoming guidebook on state Lead by Example programs (EPA 2007b). Exemplary land use policies were based on the American Planning Association's survey of state smart growth planning reform (APA 2002). States not listed in Table 5.1 earned zero points in our scoring criteria.

Because tailpipe emission standards have the greatest energy savings potential in the near-to-medium term, states that have adopted the regulations earn 2 points. Although the regulations are not yet in effect, and are pending approval from the EPA, the energy savings potential is large. States implementing moderate to substantial land use reforms were given one point and states with state fleet procurement requirements that mandate specific goals for fuel efficiency earn one point. We also ranked states by the level of per capita state transit funding, taken from the Bureau of Labor Statistics' *Survey of State Funding for Public Transportation* (BTS 2005b). The top ten states that spend most aggressively, those that apportioned about $50 per capita or more into transit funding, earn one point.

Caveats

We use a qualitative approach to scoring state policies and provide a snapshot of which policies are being pursued in states. We review best practices, but do not score states based on a direct comparison between each state program. Each policy approach is an important component of a comprehensive transportation policy; however, some strategies may have greater impacts than others. The adoption of tailpipe emission standards, for example, although still pending a waiver of approval from the EPA (see below for a detailed discussion), would have a substantial impact on energy savings, and therefore we give this category two points.

We do not, however, assign scoring weight to land use policies, transit funding, or state fleet policies. These policies likely result in varying levels of energy savings among states. For example, a state's fleet policy may be more aggressive and successful than others; however, the programs are new and energy savings and compliance are for the most part not evaluated by state agencies, making it difficult to compare programs.

Table 5.1. State Scoring on Transportation Policies

States:	CO_2 Tailpipe Emissions Standards[a]	Land Use Policies[b]	Transit Funding[c]	Fleet Efficiency[d]	Score
New York	●●	●	●	●	5
Maryland	●●	●	●		4
New Jersey	●●	●	●		4
Connecticut	●●		●	●	4
Maine	●●	●		●	4
Pennsylvania	●●	●	●		4
Rhode Island	●●	●		●	4
Vermont	●●	●		●	4
Washington	●●	●		●	4
Massachusetts	●●		●		4
California	●●			●	3
Oregon	●●	●			3
Delaware		●	●		2
Georgia		●		●	2
Minnesota			●	●	2
Wisconsin		●		●	2
Alaska			●		1
Arizona				●	1
District of Columbia			●		1
Florida		●			1
Iowa				●	1
New Hampshire				●	1
New Mexico				●	1
North Carolina				●	1
Tennessee		●			1
Texas				●	1
Hawaii				●	1
Illinois				●	1
Kentucky				●	1
Michigan				●	1
Ohio				●	1

[a] Source: Hinchman (2006); UCS (2007)
[b] Source: APA (2002)
[c] Source: BTS (2005b). See Table B.1 in Appendix B for a complete ranking of state transit funding. States that spend at least $50 per capita on mass transit earn one point.
[d] Source: EPA (2007b)

Tailpipe Emission Standards

Reducing greenhouse gas (GHG) emissions indirectly addresses vehicle energy use. In 2002, California passed the Pavley Bill, the first U.S. law to address GHG emissions, including carbon dioxide, in auto exhaust.[29] The law required the California Air Resource Board (CARB) to regulate GHG as part of the California Motor Vehicle Program. In 2004, CARB adopted the rules to regulate GHG. The regulations require automakers to begin in the 2009 Model Year (MY) to phase in a new California breed of cars and trucks that will collectively emit 22% fewer greenhouse gases than 2002 vehicles in the MY 2012 and 30% fewer in MY 2016. Eleven states have adopted California's GHG regulations (see Table 5.2) and Maryland has passed a bill that puts forward the regulations and is awaiting a very likely signature from its governor. In addition, Arizona, New Mexico, Minnesota, Tennessee, North Carolina, and Texas are also actively considering adoption of the regulations (UCS 2007). The GHG rules adopted by CARB will require approval of a waiver from the EPA before they can go into effect.[30]

The GHG reductions are expected to be achieved almost entirely by efficiency. Several technologies stand out as providing significant, cost-effective reductions in emissions. Among others, these include the optimization of valve operation, turbocharging, improved multi-speed transmissions, and improved air conditioning systems (see CARB 2004).

In order for the tailpipe emission standards to go into effect in the 12 states listed in Table 5.2, the EPA must first approve a waiver of federal pre-emption for California's regulations. On December 21, 2005, CARB submitted to EPA a request for a waiver of federal pre-emption for its regulations pertaining to greenhouse gas. Since adoption of the regulations, the major automakers have sued California over the Pavley Bill, stating that the law violates federal pre-emption embodied in the CAFE fuel economy statute. In 2006, car companies filed lawsuits in federal and state courts in Fresno. These actions were staged pending a Supreme Court decision on whether CO_2 is a pollutant that can be regulated under the Clean Air Act (Massachusetts v. EPA).

The Supreme Court's April 2007 decision in Massachusetts v. EPA may accelerate resolution of states' efforts to regulate tailpipe emissions of CO_2. The decision appears to support California's case regarding the Pavley bill. Since CO_2 is now a Clean Air Act pollutant, states have the right to regulate it more stringently than federal rules would. It is thus more likely that the 12 states that have adopted this policy will be able to proceed and therefore likely to become a major force driving fuel economy gains to reduce CO_2 emissions.

[29] California Law AB 1493

[30] See CARB's fact sheet: http://www.arb.ca.gov/cc/factsheets/cc_newfs.pdf.

Table 5.2. States that Adopted California's GHG Tailpipe Emission Standards

State
California
Vermont
Maine
New Jersey
Connecticut
Rhode Island
New York
Oregon
Washington
Massachusetts
Pennsylvania*
Maryland**

Sources: Hinchman (2006); UCS (2007)

* The Pennsylvania Clean Vehicles Program, which will incorporate the Pavley regulations, was approved by the state's Independent Regulatory Review Commission (IRRC) in November 2006 and is expected to be signed off by the Attorney General's Office (PennEnvironment 2006).

**A bill has passed in Maryland and is awaiting a likely signature from Governor O'Malley.

State Fleet Efficiency

Several state legislatures have enacted statutes to improve the environmental performance of their own state fleets and reduce fuel costs by purchasing the most efficient, clean vehicles available. The plans, policies, and executive orders vary widely among states, with several states establishing requirements to improve fleet efficiency by a specific amount, some setting targets and requirements for the purchase of alternative fueled-vehicles (AFVs),[31] and several other states setting imprecise goals to simply "improve state fleet fuel efficiency." We give a point to only those states whose fleet policies require action(s) on the part of a specific agency to improve fleet efficiency, based on analysis in a forthcoming EPA guidebook on state Lead By Example programs (EPA 2007b). For example, this could include mandating a certain percent reduction in energy consumption by its fleet. We do not, however, include state Lead by Example policies that only require action on renewable fuel initiatives, such as alternative fuel vehicle procurement requirements or plans to incorporate alternative fuels in the state fleet, because these actions do not specifically address improvement of state fleet vehicle fuel efficiency.

State Examples

- *California.* The state must meet a 10% reduction in energy used by the state fleet. AB 2264 requires the Department of General Services and the Energy Commission to

[31] The Energy Policy Act (EPAct) defined alternative fuel vehicles to include any dedicated, flexible-fuel, or dual-fuel vehicle designed to operate on at least one alternative fuel, such as ethanol, biodiesel, natural gas, hydrogen, etc. See http://www1.eere.energy.gov/vehiclesandfuels/epact/about/epact_fuels.html for a list of EPAct alternative fuels. AFVs are available in a variety of vehicle types ranging from light to heavy duty. Under EPAct, hybrid vehicles do not count as AFVs because they are powered primarily by conventional gasoline.

define a minimum permissible miles per gallon (mpg) for passenger vehicles and light-duty vehicles in the state fleet by June 1, 2007.

- *Wisconsin*. By executive order, state agencies are required to improve fleet efficiency through the reduction of petroleum-based gasoline in their fleet vehicles by 20% by 2010 and by 50% by 2015; reduction of petroleum-based diesel fuel must be 10% by 2010 and 25% by 2015.

Land Use Policies

Raising fuel economy and emissions standards will not alone address transportation efficiency in the long term if growth in total vehicle miles traveled goes unchecked. In 2003, U.S. highway VMT was 2.9 trillion, up 26% since 1993. Unlike vehicle fuel economy, which is addressed at the federal level, strategies to manage VMT are typically local or regional, giving states an important role in encouraging smart growth and slowing growth in VMT. According to the American Planning Association (APA), smart growth is the "planning, design, development and revitalization of cities, towns, suburbs and rural areas in order to create and promote a sense of place and community, and to preserve natural as well as cultural resources" (APA 2002). Transportation is inherently tied to smart growth land use policies. Land use policies can lower VMT by incorporating principles of both smart growth and smart transportation, including:

- Transit-oriented development (TOD), which encourages mixed land uses (mix of jobs, stores, and housing) and good street connectivity that makes neighborhoods pedestrian-friendly;
- Higher residential density;
- High-quality transit service; and
- Activity centers where destinations are close together.

Successful strategies for smart growth land use planning reform will vary widely among states due to the current infrastructure, geography, and political structure. However, the core principles of smart growth should be embodied in state comprehensive plans. Several barriers have emerged for states that have pursued smart growth land use reform. These include:

State vs. local focus: Local governments bear the primary responsibility for planning and implementing smart growth. General state transportation planning depends on the collaboration of three main agencies: the state transportation agency (DOT or Highway Department), the transit operator, and the regional metropolitan planning organization (STPP 2006). However, local governments make most land use decisions, whose impacts often have no political boundaries. States are now recognizing this and are requiring written local comprehensive plans, coordination among neighboring jurisdictions in the planning process, and inter-jurisdictional consistency among the various plans (APA 2002). This type of regional cooperation among communities and government agencies is crucial to comprehensive planning and growth management systems.

Perceived high cost: Some states consider land use reforms to be too costly. However, numerous studies show that smart growth planning reforms spur significant financial savings, job growth, economic development, revitalization, improved quality of life, and other benefits (see NGA 2000; Burchell, Dolphin, and Galley 2000).

Implementation: States that have adopted comprehensive land use reforms often had to focus recent efforts on effective implementation. States continue to experiment with a mix of incentives, mandates, and initial investment costs (APA 2002).

Leading States

- *Maryland*: The Smart Growth and Neighborhood Conservation Act requires that existing, older communities be given priority for public infrastructure, services, and schools. This policy approach recognizes that other major state subsidies support the development of sprawl and therefore this Act favors existing communities. Another innovative policy approach in Maryland is the "Live near Your Work Program," under which employers and state and local governments each provide $1,000 to people who purchase a home near their workplace.

- *New Jersey*: The New Jersey State Plan is estimated to save as much as $2.3 billion in capital costs. The 2000 "fix-it-first" transportation bill passed in New Jersey mandates that roadway and transit system maintenance reach acceptable standards before new highways are built. This strategy has achieved the goals of cutting traffic congestion, protecting green space, and prioritizing repair. In 2006, the state's Smart Growth Planning Grants program was appropriated $2.3 million to help municipalities, counties, and nonprofit agencies help plan for, among other things, land use design guidelines and downtown revitalization.

State Transit Funding

In addition to federal funds for public transit, states also pull funding from their own budgets. A state's investment in public transit is a key determinant of its interest in promoting mass transit opportunities. Transit funding should be accompanied with comprehensive state planning. Appendix Table B.1 shows state transit funding for fiscal year (FY) 2005, expressed as per capita dollars. The top ten states, those that spent about $50 or more per capita on mass transit, earned one point in the overall transportation scorecard. These ten states are Massachusetts, Maryland, New York, New Jersey, Alaska, Delaware, Pennsylvania, District of Columbia, Connecticut, and Minnesota (see Table B.1).

Other Policies

Tolling pricing policies. Tolls that vary depending on the time of day (i.e., higher prices during peak travel periods or reduced tolls during "shoulder" periods immediately before and after peak periods) encourage some travelers to use tolling facilities during less congested periods or to use mass transit, which can help lower VMT. Shifts in the number of travelers during peak periods can result in reduced need for additional road capacity, which can help stabilize VMT. This can be explained by the concept of "induced demand." Adding new road capacity has the effect of reducing cost of travel and thus increases demand, and higher demand means higher levels of traffic on new roads. Reducing the need for additional capacity, on the other hand, has the ultimate effect of reducing VMT and therefore reducing vehicle fuel consumption.

Variable tolls have been operating in Lee County, Florida since 1998 and have proven to be successful in encouraging a shift in the time of travel. Higher peak period toll rates were placed into effect by the New Jersey Turnpike and Port Authority of New York and New Jersey in 2000 and 2001, respectively. There is a high potential for variable tolling policies in most states because many existing bridges and tunnels in the U.S. are already tolling facilities and there are almost 5,000 miles of toll highways. Tolls that not only encourage a shift in time of travel periods, but also encourage the use of mass transit would significantly benefit a more efficient transportation system. See the U.S. Department of Transportation's "Value Pricing Pilot Program" Web site for more information on states that are pursuing variable tolling policies and other pricing programs.[32]

Feebates. While states cannot regulate fuel economy, they can offer incentives, disincentives, and information to influence buying practices. "Feebate" programs are one available tool at the state level. Under the program, purchasers of vehicles with low fuel economy pay an extra fee and purchasers of vehicles with high fuel economy earn a rebate. Although not yet adopted in any state, feebates have been proposed in several states.

CHAPTER 6: APPLIANCE AND EQUIPMENT EFFICIENCY STANDARDS

Background

Every day in our homes, offices, and public buildings we use energy-consuming appliances and equipment that are much less efficient than other available models. While the usage and energy cost for a single device may seem small, the extra energy consumed by less efficient products collectively adds up to a significant amount of wasted energy. Real and persistent market barriers, however, inhibit sales of more efficient models. Appliance efficiency standards overcome these barriers by requiring manufacturers to meet minimum efficiency levels for all products, therefore removing the most inefficient products on the market.

The two principal types of barriers are what economists call principal-agent and information-cost barriers.

- ***Principal-agent barriers:*** These are exemplified by "split-incentive" problems, where the "agent," such as a homebuilder or landlord, buys the product while the "principal" pays the energy bills, or "panic purchases" where a plumber or heating contractor is the agent for customers who need replacements immediately.
- ***Information-cost barriers:*** These show up in the form of limited consumer knowledge about efficient products, and the bundling of high efficiency with

[32] See http://www.ops.fhwa.dot.gov/tolling_pricing/value_pricing/index.htm.

additional, high cost features, making it hard for the consumer to figure out what's "economically optimal."

Appliance efficiency standards were first enacted at the state level by California in 1974 under the State Energy Resources and Conservation Development Act. Standards were argued to save consumers money by lowering operation costs and removing inefficient products from the marketplace. California's first standards applied to refrigerators, freezers, room air conditioners, and central air conditioners. Soon thereafter California expanded its appliance standards to include space heaters, water heaters, plumbing fittings, fluorescent ballasts, and large air conditioners (CEC 1983). In the early to mid-1980s, standards for central and room air conditioners were adopted in Florida, Kansas, and New York. In 1986, Massachusetts adopted standards on refrigerators, room air conditioners, water heaters, fluorescent ballasts, and showerheads (Nadel 1994).

In 1987, Congress passed the National Appliance Energy Conservation Act (NAECA). Products in the legislation included refrigerators, freezers, air conditioners, furnaces, boilers, dishwashers, and clothes washers and dryers, among others. Additional product standards for many of the most common types of lamps, electric motors, commercial heating and cooling equipment, and plumbing fittings were added in the Energy Policy Act of 1992. Under NAECA, DOE was instructed to update standards in accordance with new technology making higher standards economically justifiable. Updates were completed in 1997, 2000, and 2001; however, DOE missed deadlines for twenty other updates. The Energy Policy Act of 2005 set new efficiency standards for 16 products and directed DOE to set standards via rulemaking for five additional products (Nadel et al. 2006). In January 2006, the Department of Energy released a 5-year schedule for addressing backlogged appliance standards rulemaking and those that are outlined in EPAct 2005. The schedule set final action dates for issuance of rulemakings for 18 products in the backlog and 5 products from EPAct 2005 (DOE 2006a).

The many missed deadlines and the extended time schedule for DOE to issue rulemakings has made action at the state level as important as ever. In particular, DOE has never used its authority to add new products to the standards program and instead, states have taken the lead on developing standards for products that are not regulated. Since 2002, 11 states have passed legislation and/or regulation on efficiency standards. California has passed two sets of standards since 2002: the first, in early 2002, placed standards on 10 new appliances; in 2004, the second set placed standards on 19 new appliances (a few of the 2004 standards were refined further in 2006). This wave of efficiency standards research and policies in California has served as a model for other states: since 2002, ten other states have adopted standards, drawing from California standards, ENERGY STAR specifications, and other widely used specifications (see Table 6.1).

Many of the standards adopted by these states, however, have since been covered under the Energy Policy Act (EPAct) of 2005. Once states passed standards on new products, manufacturers agreed to consensus national standards on these products. Under the rules of federal preemption in EPAct 2005, state standards are preempted when federal standards become effective. In some cases, state standards may be enforced up until the federal legislation becomes effective. In addition, several states have adopted standards on federally regulated products and have either petitioned DOE for exemption from federal preemption or are planning to prepare such petitions.

Methodology

We scored states based on the number of appliance efficiency standards enacted since 2002. Table 6.1 shows the eleven states that have passed standards legislation and/or regulation since 2002, the number of standards enacted, and the current number of standards in each state that were not preempted by federal legislation. For three of the states (Connecticut, Maryland, and New Jersey), all standards were subsequently preempted by EPAct 2005. Because all states that enacted appliance efficiency standards (regardless of whether standards were preempted) have helped to put pressure on manufacturers and the federal government to update efficiency standards, we scored states on an average of the total number of standards originally enacted in the state and the number of standards in effect today (see Table 6.1). Each state earns a score of zero to three: **3**—more than fifteen product standards; **2**—six to fifteen product standards; **1—**one to five product standards; and **0**—no standards. States not listed in Table 7.1 have no efficiency standards.

Caveats

Because new federal appliance efficiency standards in some cases preempt state standards, the energy savings impacts from some standards are not directly attributable to state legislation or regulation. However, state adoption of standards has put pressure on manufacturers and DOE to update the standards. To this effect, we take into account state standards that have been preempted.

Table 6.1. State Scoring for Appliance Efficiency Standards.

State	Number of products covered by standards (since 2002)	Number of products covered by standards not preempted by federal legislation	Average number of standards	Date most recent standards adopted	Score
California	29	21	25	2002, 2004, 2006	3
Rhode Island	19	8	13.5	2005, 2006	2
New York	16	5	10.5	2005	2
Oregon	12	3	7.5	2005	2
Washington	12	3	7.5	2005	2
Arizona	12	2	7	2005	2
Massachusetts	7	7	7	2005	2
Vermont	6	6	6	2006	2
Maryland	9	0	4.5	2004	1
Connecticut	8	0	4	2004	1
New Jersey	8	0	4	2005	1

Note: As of July 2006

Leading States

- *California*: With 29 efficiency standards enacted since 2002 and a total of 21 standards that are not preempted by federal legislation, California continues to lead the way on appliance efficiency standards. In coordination with Pacific Gas & Electric (PG&E), the California Energy Commission has done substantial research on efficiency standards and test procedures that have helped other states develop legislation on efficiency standards.

- *Rhode Island*: The Energy and Consumer Savings Act of 2005[33] set minimum efficiency standards for thirteen products, nine of which were immediately preempted by EPAct 2005. Two of the standards will be implemented for some time before federal legislation takes effect. The state immediately went to work to adopt additional efficiency standards. In June 2006, Rhode Island enacted legislation that required the public utilities commission to establish new efficiency standards by June 1, 2007 for eight new products, including commercial hot food cabinets, metal halide lamp fixtures, residential furnaces and boilers, residential furnace fans, external power supplies, reflector lamps, walk-in refrigerators and freezers, and bottled water dispensers.[34]

CHAPTER 7: TAX INCENTIVES

Background

State tax incentives for energy efficiency are an important instrument for increasing the use of technologies that provide benefits to both residents and the state overall. Several market barriers, including lack of awareness and high first cost, limit consumer investment in energy-efficient products and services. State tax incentives can lower the net cost of efficient products to consumers, reducing the higher cost relative to standard models. Tax incentives can also raise the consumer awareness of eligible products, encouraging manufacturers and retailers to more actively market these products. As sales increase, prices often come down, allowing the products to function in the market without tax incentives. Incentives can take many forms: direct income tax credits for individuals or businesses; reduced sales tax on eligible products; and income tax deductions for individuals and businesses.

Tax incentives were first offered in the 1970s at both the federal and state level, although evidence suggests that they did not have much impact on consumer behavior. Several reasons have been cited for the lack of success from these incentives, including low efficiency requirements for eligibility that led to "free riders," small credit amounts, limited promotion, and high administrative costs. Lessons learned from these early tax credits are that the incentives should target only the very high-efficiency technologies and be large enough to affect decision-making.

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[33] See http://www.rilin.state.ri.us/Billtext/BillText05/HouseText05/H5307B.pdf
[34] See http://www.rilin.state.ri.us/Billtext/BillText06/SenateText06/S2844Aaa.pdf

Incentives for energy efficiency measures are needed to overcome the several market barriers limiting private investment in cost-effective energy efficiency measures. These include:

- *First cost issues.* More efficient products, although often cost-effective on a life-cycle basis, often have higher first costs that discourage consumers.
- *Risk aversion.* Few consumers are "early adopters" of emerging technologies because of the perceived risks associated with these products.
- *Low visibility in the market.* Low market share for efficient products means low customer awareness.
- *Low importance for many consumers.* Energy is a relatively small business expense in most industries and is therefore not an area that decision-makers choose to focus on for improving profitability.

State tax incentives should have both short-term and long-range benefits. In the short term, the tax incentive can increase market share and visibility of a technology that would otherwise be harder for consumers to find and afford. As market share increases, more market actors (salespeople, installers, etc.) become vested in the technology as it can be more profitable than the status quo. As more firms enter the market, the resulting competition can drive down prices and further increase market share in the long term. See Brown et al. 2003 for a comprehensive discussion of state energy efficiency and green buildings tax credits.

State-funded financial incentives programs benefit residents, the state, and both local and global environments. The incentives can also be leveraged by federal tax incentives for efficient products. In July 2001, the U.S. House of Representatives passed a bill that provides tax credits, for a 5-year period, for several products, including efficient new homes and commercial buildings, hybrid and fuel-cell vehicles, and efficient refrigerators and clothes washers. The tax credits are likely to be extended.

Methodology

We used the Database of State Incentives for Renewables & Efficiency (DSIRE 2006) and the Alliance to Save Energy's State Energy Efficiency Index (ASE 2005) to gather information on current state tax incentive programs for buildings and equipment. To identify hybrid-electric vehicle (HEV) tax incentive programs, we relied on the Union of Concerned Scientists' list of state hybrid incentives (UCS 2006b) and DOE's Energy Efficiency and Renewable Energy (EERE) "Clean Cities" database of state and federal incentives (DOE 2006b). States earned one point in each category for having an incentive program and capped at a maximum of three points (see Table 7.1). States not listed in Table 7.1 currently offer no tax incentives for energy efficiency. For each category, we list examples of state tax incentive programs. Leading states with comprehensive tax programs that include several categories of incentives are listed at the end of the chapter.

Caveats

The success of energy efficiency tax incentive programs, which require incentives that are large enough to motivate consumers, vary among states. Some programs offer personal tax credits, others offer income tax deductions, and others offer tax deductions for interest on loans for energy efficiency. Allowable cost credit caps vary among states. Although some programs are more successful than others, many of the programs are new and therefore evaluations have not been performed consistently enough to score states based on measures of success. When available, these criteria of successful programs could be used in future versions of the *Scorecard.*

Commercial Green Buildings Tax Credits

The term "green buildings" is used broadly to describe buildings that are built using sustainable products, use clean energy resources, are energy-efficient, and are in locations that are environmentally preferred. Some states have encouraged commercial green buildings through an income tax credit for builders, developers, owners, and/or tenants. Five states currently offer commercial green buildings tax incentives: Maryland, Nevada, New York, Montana, and Oregon. While New York and Maryland offer tax breaks for buildings that meet green building standards, Oregon and Nevada instead offer substantial tax incentives for whole buildings that meet Leadership in Energy and Environmental Design (LEED) ratings.[35]

In 2000, the New York State Income Tax Credit allocated $25 million towards tax credits for whole buildings that meet the green building criteria, or for buildings with components—such as fuel cells, photovoltaic systems, and refrigerants—that meet green building standards. Each building must be certified by a licensed architect or engineer in order to receive the credit. A 2005 amendment set aside another $25 million and extended the program until 2009. Credits are capped at $2 million per building. In 2001, Maryland passed an income tax credit for commercial and multifamily residential buildings of at least 20,000 square feet. The program provides tax credits for 20–25% of the incremental cost of adding PV to a building, 30% of the costs of installing a fuel cell, 25% of the cost of installing a wind turbine, or 8% of the allowable costs of constructing or rehabilitating a whole green building. Allowable project costs cannot exceed $120 per square foot for whole or base buildings. In Montana, taxpayers may deduct a portion of the cost of investment in a building that promotes energy conservation, up to $1,800 for residential buildings and $3,600 for non-residential buildings.

Under Nevada's program adopted in 2005, buildings that meet or exceed the LEED Silver rating are eligible to receive up to 50% off their property taxes for up to 10 years. In order to receive the credit, each project must be registered with the U.S. Green Building Council and must have a signed letter of verification from the director of the Nevada State Office of Energy. Under its Sustainable Buildings program implemented in October 2001, Oregon offers tax credits of up to 35% of the full or incremental cost of the new building or renovation project (up to $10 million per project), but the credit is broken down by dollars per square foot available according to the LEED Silver, Gold, and Platinum certification labels (Brown et al. 2002). Buildings must exceed the LEED energy efficiency base by 20%

[35] LEED is a rating system created by the U.S. Green Building Council that offers guidelines for evaluating the environmental performance of buildings. See http://www.usgbc.org.

for new buildings and 10% for renovation projects. All projects must be certified by the U.S. Green Buildings Council both prior to construction and after completion.

Table 7.1. State Tax Incentives

States	Green Commercial	New Homes	Home Weatherization	Equipment	Vehicles	Score
District of Columbia		●	●	●	●	3
Oregon	●			●	●	3
Montana	●		●	●		3
California			●	●		2
Connecticut				●	●	2
Louisiana		●			●	2
New York	●		●			2
Arizona		●				1
Colorado					●	1
Idaho			●			1
Maryland	●					1
Massachusetts				●		1
Nevada	●					1
New Mexico					●	1
Oklahoma		●				1
South Carolina					●	1
Washington					●	1

Tax Incentives for Energy-Efficient New Homes

Three states, as well as Washington, D.C., offer tax breaks for the construction of energy-efficient new homes: Arizona, Louisiana, and Oklahoma. Both Arizona and the District of Columbia allow the original owner of a new single-family residence, condominium, or town house that exceeds the 1995 Model Energy Code threshold by at least 50% to subtract 5% of the sales price from his/her income tax. In Arizona, this credit is capped at $5,000. In Washington, D.C., the limit is set at $2,000.

Under its Home Energy Rebate Option (HERO) program, Louisiana offers tax breaks of up to $2,000 for new homes that receive at least an 86% on the Energy Rated Homes of Louisiana (ERHL) scale. To receive the credit, homeowners must submit an application before they start building, and have their home inspected after it has been completed. Credits are dispersed in relation to calculated energy savings.

Instead of offering tax breaks to homeowners, Oklahoma allows contractors or primary builders to write off some of the costs of installing energy-efficient furnaces, boilers, or heat pumps, as well as other measures such as sealing ducts and vents and installing more insulation. For homes that are between 20% and 39% above the International Energy Conservation Code 2003, builders can deduct up to $2,000; for homes at least 40% above the code, builders can write off $4,000.

Home Weatherization Tax Incentives

Four states, plus the District of Columbia, offer tax breaks for home weatherization: California, Idaho, Montana and New York. Washington, D.C., Montana, and Idaho all offer income tax breaks to homeowners for weatherization costs. Idaho, for example, offers homeowners an income tax deduction of 100% of the labor and material costs of installing new insulation. In Montana, homeowners are eligible for tax credits of 25% (up to $500) of the costs of investment in the physical attributes of a building (insulating walls, floors, and ceilings) or in a water, heating, or cooling system.[36]

California and New York each have lesser provisions for helping homeowners with these costs. In New York, for example, owners of one- to four-family residences can write off 100% of the added property taxes due to the increased value of the home resulting from installing energy-efficient furnaces, boilers, or heat pumps, as well as other measures such as sealing ducts and vents and installing more insulation. Homeowners in California can deduct 100% of interest paid on loans taken in order to weatherize a home, including caulking, insulating, and duct-sealing.

Energy-Efficient Equipment

Incentives for energy-efficient products and equipment can be relatively inexpensive to states and can lower first costs to the customers. Four states, plus Washington, D.C., offer tax incentives for the purchase or installation of energy-efficient equipment: California, Connecticut, Massachusetts and Oregon. Washington, D.C. and Oregon offer income tax breaks for the purchase of energy-efficient equipment, whereas Connecticut and Massachusetts exempt energy-efficient equipment from sales tax for specific time periods. For example, in Connecticut, energy-efficient heating equipment was tax exempt from November 25, 2005 until April 1, 2006 and in Massachusetts, homeowners who purchased certain energy-efficient products between November 1, 2005, and April 1, 2006 could write off 30% of those costs on their income taxes. In California, homeowners can deduct the interest on loans taken from publicly owned utility companies used for purchasing energy-efficient residential equipment, such as heating, lighting, and air conditioning equipment.

Energy-Efficient Vehicles

The high cost of fuel-efficient vehicles is a key barrier to their entry into the market place. To encourage consumers to purchase these vehicles, states can offer a number of financial incentives, including tax credits, rebates, sales tax exemptions, and other tax-related inducements. Several states have begun to offer tax incentives to individual purchasers of a variety of vehicle classes, including alternative-fuel vehicles (AFVs), which typically include vehicles that run on compressed natural gas (CNG) or ethanol, electric vehicles (EVs), low-emission vehicles (LEVs), and hybrid-electric vehicles (HEVs). While AFVs, EVs and LEVs can provide substantial environmental benefits by reducing pollution, they do not improve vehicle fuel efficiency and are therefore not included in our scorecard. We

[36] This tax credit can be applied to both the purchase of energy-efficient equipment and home weatherization.

reviewed only states that have adopted tax incentives for HEVs, which incorporate technology that improves vehicle fuel efficiency.

Currently, eight states offer tax incentives to promote the use of energy-efficient vehicles. See Table 7.2 for a summary of the tax incentives offered in these states.

Table 7.2. State Tax Incentives for Hybrid-Electric Vehicles

State	Tax Incentive
Colorado	Prior to July 1, 2011, an income tax credit is available from the Colorado Department of Revenue for the incremental cost of purchasing a HEV. For a Honda Insight, for example, the one-time tax credit is $4,437.
Connecticut	Prior to July 1, 2008, hybrids getting at least 40 MPG are exempt from the state's 6% sales tax.
District of Columbia	One of the provisions of The DMV Reform Amendment Act of 2004, which went into effect on April 15, 2005, exempts owners of hybrid and other alternative fuel vehicles from excise tax on their vehicles, and reduces the vehicle registration charge, while excise tax rates for heavy passenger vehicles (over 5,000 pounds) increases to 8% (from 7%).
Louisiana	The state offers an income tax credit worth 20% of the incremental cost of purchasing an Original Equipment Manufacturer (OEM) HEV or AFV. The tax credit cannot exceed the lesser of 2% of the total cost of the vehicle or $1,500.
New Mexico	From July 1, 2004 through June 30, 2009, HEVs with an EPA fuel economy rating of at least 27.5 miles per gallon are eligible for a one-time exemption from the motor vehicle excise tax at the time of the issuance of the original certificate of title for the vehicle.
Oregon	A Residential Tax Credit of up to $1,500 is available for the purchase of a HEV or dual-fuel vehicle. A Business Energy Tax Credit is available for the purchase of HEVs and dual-fuel vehicles. The tax credit is 35% of the incremental cost of the system or equipment and is taken over five years.
South Carolina	Consumers buying hybrid vehicles are provided a state tax credit equal to 20% of the federal tax credit scheduled to begin in tax year 2006.
Washington	Effective from January 2009 through January 2011, the state use tax and retail sales tax do not apply to sales of new passenger cars, light duty trucks, and medium duty passenger vehicles that utilize hybrid technology and have an EPA-estimated highway gasoline mileage rating of at least 40 miles per gallon.

Sources: UCS (2006b); DOE (2006b)

Leading States

- *Washington, D.C.*: The District of Columbia offers tax incentives for new building construction, existing home weatherization, energy-efficient product procurement, and efficient vehicles. Tax breaks are available for 10–25% of the costs of home weatherization or purchasing equipment that meets ENERGY STAR and EPA efficiency standards. Credits are 15% for efficient lighting fixtures, 20% for heating and cooling equipment, and 25% for insulated doors and double-paned windows. Incentives for equipment used for renovations are capped at $500 per year. For new home construction, the credit allows the original owner of a new home that exceeds the 1995 Model Energy Code threshold by at least 50% to subtract 5% of the sales price from his/her income tax (maximum $2,000).

- *Oregon*: Oregon has run tax incentive programs since 1979 and is generally considered to run the most comprehensive state energy efficiency tax incentive program. In 2003, the state's Residential and Business Energy Tax Credit (RETC and BETC) programs, which had combined annual spending of $30.9 million, are estimated in one year to have increased output in Oregon's economy by $42.5 million, decreased commercial and residential energy costs by $27.9 million, and increased tax revenues for state and local governments by $2.7 million (ECONorthwest 2005). Oregon offers tax incentives for 25% of the cost of purchasing energy-efficient appliances (which generally range from $50 to $180). Also, Oregon offers tax credits of 25% (up to $500) of the costs of servicing heating and air conditioning systems.

CHAPTER 8: STATE LEAD BY EXAMPLE PROGRAMS: FACILITIES, EQUIPMENT PROCUREMENT, AND RESEARCH AND DEVELOPMENT

Background

A state's own facilities, fleets, and operations offer a unique opportunity for state governments to lead by example, incorporating energy efficiency measures into their facilities and achieving significant energy cost savings. States that take action to improve efficiency in their own buildings and vehicles therefore represent leaders in energy efficiency. Efficiency improvements in state building and fleets can be substantial, achieving savings on energy bills, which thereby frees up public money for other purposes, and increasing the public visibility of energy efficiency.

State and local governments operate many facilities, including office buildings, public schools, colleges, and universities, and the energy costs to run these facilities can account for as much as 10% of a typical government's annual operating budget (EPA 2007b). Lead by Example (LBE) programs can reduce energy consumption in state buildings and thereby reduce state energy costs through lowered operations and maintenance costs. Of additional significant benefit, states that administer effective energy management programs and promote energy efficiency and clean energy solutions are encouraging economic development in local and regional communities.

In Wisconsin, where state building energy use has been tracked since the early 1970s, energy intensity (the amount of energy consumed per square foot) in state buildings dropped by nearly 30% throughout the 1970s and early '80s due to energy savings initiatives; however, since then has been on the rise (Mapp, Bair, and Smith 2006). The trend in rising energy intensity is due to a number of factors, including: introduction of personal computers; increased building ventilation rates in response to indoor air quality concerns; new energy-intensive university laboratories; and other factors. Buildings at the University of Wisconsin, for example, are the most energy intensive of all state facilities and consume 75% of the entire state building fleet's energy (Mapp, Bair, and Smith 2006). Continued growth in square footage further contributes to growing energy consumption by state facilities.

Several states explicitly direct their own government, through legislation or executive order, to meet energy efficiency requirements (see Table 8.1). Voluntary programs can also be used in conjunction with mandates. EPA's ENERGY STAR Challenge Program, for example, calls on governments, schools, and businesses across the country to identify the many buildings where cost-effective improvements can reduce energy use by 10% or more. States can encourage energy-efficient improvements in their own facilities and reach out to businesses by participating in this program.

There are several barriers impeding more widespread implementation of Lead by Example programs by state governments. These include:

- *Limited Knowledge*. Sharing of information and learning from the experiences of other states can help break the barrier of limited knowledge.
- *Insufficient Funding*. Innovative financing mechanisms that are already being used by many states can fund LBE programs.
- *Limited Support and Staff Availability*. Identifying a "champion" in each state agency to ensure that LBE programs are implemented can help streamline management. Establishing rewards and recognition for program initiatives can also help raise awareness and support.

State Policies and Programs

There are several key policies that states can incorporate to improve efficiency in their facilities:

- Energy Efficiency Performance Criteria, including EPA's ENERGY STAR requirements;
- New and existing building energy efficiency targets and savings goals;
- Procurement requirements, including ENERGY STAR appliances, energy-efficient equipment and vehicles, or "green fleets";
- Innovative financing mechanisms (e.g., energy efficiency loan funds, energy savings performance contracts that require that the savings cover the cost of financing improvements);
- Adoption of a tracking and reporting system for agency-by-agency data collection;
- Implementation of commissioning and retro-commissioning requirements; and
- Assigning an agency-level energy manager to be accountable for progress.

Methodology

States earn a maximum of three points in the LBE category: one point for state facilities performance criteria; one-half of a point for energy savings targets in new and existing state buildings; one-half of a point for energy-efficient product procurement (does not include state fleets); and one point for state energy R&D institutions. Legislation, plans, policies, and executive orders all count as LBE programs as long as specific action on the part of an identified agency is required (i.e., plans that promote, but do not require LBE action, are not included). The policy review is based on a forthcoming EPA guidebook on state Lead by

Example programs (EPA 2007b). Also, a handful of states that have exemplary finance programs, based on expert judgment, earn an extra point, although cannot exceed a maximum of three points. See Chapter 5 (Transportation) for a list of states with initiatives to improve fleet efficiency. States that earn a point for R&D have energy research centers that are members of ASERTTI, which maintains a membership list on its Web site (ASERTTI 2007). Based on ACEEE judgment, we selected only those states that have research centers with extensive R&D. See Table 8.1 for state scores on Lead By Example programs.

Energy Efficiency Performance Criteria

To assure stringent levels of energy efficiency in state buildings, governments should adhere to energy efficiency performance criteria, such as ENERGY STAR certification or other energy efficiency performance requirements. These criteria standardize efficiency levels. The ENERGY STAR certification program, for example, rates buildings on a scale of 1 to 100 based on energy use, building characteristics, and other data entered into Portfolio Manager. A score of 75 or higher indicates that the building is part of the most efficient 25% of similar buildings in the nation, and allows a building to receive the ENERGY STAR Building Label upon certification.

The Leadership in Energy and Environmental Design (LEED) green building rating system, although not primarily based on performance (also based on environmental and design criteria), includes energy efficiency requirements. To assure a high level of efficiency in state facilities, some states have specified LEED requirements plus energy efficiency requirements, such as ENERGY STAR or a specified percent improvement over minimum building efficiency codes. In Table 8.1, states are given a point for energy efficiency performance criteria if they are linked to ENERGY STAR criteria, ENERGY STAR plus LEED, or other energy efficiency performance criteria (e.g., 20% above current code) plus LEED.

Energy Savings Targets in Buildings

State building facilities are responsible for about 16 billion square feet, or about 28% of U.S publicly owned floor space and 5% of total non-residential floor space (Prindle et al. 2003). Efficiency improvements can amount to energy savings of 30% or more in existing state buildings. By establishing overall percent savings targets, in energy savings per square foot, for example, states can lead by example by striving to meet high levels of energy efficiency in their own buildings.

Energy-Efficient Product Procurement

To achieve energy savings beyond building system improvements, states should specify that purchased equipment must meet energy efficiency standards, such as ENERGY STAR. High-efficiency products can be purchased for personal electronics, office equipment, lighting systems, heating and cooling systems, and more efficient transportation fleets. Energy-efficient purchasing programs not only result in significant savings, but also stimulate the market by accelerating the demand for high-efficiency equipment.

Table 8.1. State Facilities Policy Scores

States	Energy Efficiency Performance Criteria (1 Point)	New and Existing State Building Targets (0.5 Points)	Energy-Efficient Product Procurement (0.5 Points)	R & D (1 Point)	Total Score
California	●	●	●	●	3
New York*	●	●	●	●	3
Iowa*		●	●	●	3
Wisconsin	●	●		●	2.5
North Carolina		●	●	●	2
Arizona	●	●	●		2
District of Columbia	●	●	●		2
Colorado*		●	●		2
Hawaii	●	●	●		2
Maryland	●	●	●		2
Massachusetts	●	●	●		2
Michigan	●	●	●		2
New Hampshire	●	●	●		2
Florida		●		●	1.5
Kentucky	●	●			1.5
New Mexico	●	●			1.5
Texas*		●			1.5
Alabama		●	●		1
Connecticut		●	●		1
Illinois		●	●		1
Kansas*					1
Maine		●	●		1
Minnesota		●	●		1
New Jersey		●	●		1
Ohio		●	●		1
Pennsylvania		●	●		1
South Carolina		●	●		1
Utah		●	●		1
Vermont		●	●		1
Nevada		●			0.5
Rhode Island		●			0.5
Washington		●			0.5
Montana		●			0.5
Oregon		●			0.5
Delaware			●		0.5
Idaho		●			0.5
Missouri		●			0.5
Arkansas					0
Georgia					0
Indiana					0
Virginia					0
Alaska					0
Louisiana					0

States	Energy Efficiency Performance Criteria (1 Point)	New and Existing State Building Targets (0.5 Points)	Energy-Efficient Product Procurement (0.5 Points)	R & D (1 Point)	Total Score
Mississippi					0
Nebraska					0
North Dakota					0
Oklahoma					0
South Dakota					0
Tennessee					0
West Virginia					0
Wyoming					0

* States with exemplary innovative finance mechanisms were given an extra point.

Research and Development

In 1990, several state energy R&D institutions established the Association of State Energy Research and Technology Transfer Institutions (ASERTTI)[37] in response to the increasing need for state initiatives in R&D. In addition to providing a variety of services to promote the creation, development, and commercialization of new technologies for energy efficiency, state R&D efforts can address a number of market failures that persist in the energy services marketplace (Pye and Nadel 1997). State-level institutions have the advantage of focusing on regional needs and opportunities that are not addressed by national programs. State institutions can also coordinate a range of resources from across the state.

Other Policies

Innovative financing. States are developing a wide range of innovative financing mechanisms to finance programs to implement energy efficiency improvements in existing buildings and new state facilities, including revolving loan funds, tax-exempt master lease-purchase agreements, lease revenue bonds, pension funds, and performance contracting. These mechanisms are usually administered by the state energy office or other lead agency, which coordinates the program across multiple state agencies.

Iowa has been a leader in state financing for public facilities. Legislation passed in the 1980s established the Iowa Energy Bank, which allows state agencies to use lease-purchase financing and loans for energy-management improvements, and the State Facilities Program (EPA 2006d). The Texas LoanSTAR program, which was initiated by the Texas Energy Office in 1988, uses a revolving loan fund mechanism that is funded at about $100 million. As of April 2006, LoanSTAR funded a total of 187 loans of which 17 were to state agencies, 46 to institutions of higher education, 36 to local governments, 78 to independent school districts, and 10 to county hospitals (SECO 2007).

[37] For more information, see http://www.asertti.org/.

Commissioning. Building commissioning for new construction and major renovation projects can ensure that building systems meet their design intent and operate optimally with other building systems. Similarly, retrocommissioning can be applied to existing buildings to restore them to optimal design and operation, and when successful results in optimal building energy efficiency. For state facilities, building and commissioning guidelines provide technical assistance, training, and evaluation support to state and local agencies and facility operators.

Leading States

- *New York.* Signed in 2001, Executive Order 111 calls for the "Green and Clean" State Buildings and Vehicles program to set targets for reducing energy consumption in state buildings, establishes energy performance criteria and guidelines for new and existing buildings, and requires the purchase of ENERGY STAR products when purchasing new or replacement equipment. Under the guidelines, new buildings constructed for state agencies or other affected entities must achieve at least a 20% improvement in energy efficiency performance relative to the state energy conservation building code. Affected entities must also seek to ensure that 20% of their annual electricity needs in 2010 are met by renewable energy resources. NYSERDA, the organization responsible for coordinating and assisting agencies with their responsibilities, reports that by Fiscal Year 2003/04, state entities had decreased energy use per square foot to 172,204 Btus/sq.ft., or a 10.2% reduction compared to a standard baseline (NYSERDA 2005). The agency also reports that many state entities, including some of the largest agencies and authorities in the state, are already close to meeting the FY 2010/2011 target of a 35% energy reduction.

- *California.* The California Energy Commission administers several Lead by Example programs. Executive order S-20-04 requires state agencies to reduce their energy consumption by 20% from 2003 levels by 2015 through cost-effective energy efficiency measures and distributed generation. To achieve the savings, all state new and renovated state-owned facilities must meet LEED Silver requirements, and agencies must seek office space leases in buildings with an ENERGY STAR rating (EPA 2006d). All state facilities must be benchmarked for energy efficiency using EPA's Portfolio Manager. Both the CEC and CPUC are using CHP systems in their buildings to help meet the energy efficiency goals.

- *New Hampshire*. Executive Order 2005-4 requires state agencies to reduce energy use by 10%. Purchased equipment must have an ENERGY STAR rating, all state facility construction and renovation must exceed the state energy code by 20%, and all state vehicles must achieve a minimum fuel economy of 27.5 MPG (the current national average is 24.6).

- *Wisconsin.* Signed in 2006, executive order 145 directs the Department of Administration to set energy efficiency goals for state facilities to reduce overall energy use by 20% by 2010 (from a FY05 baseline). New state facilities must achieve energy savings of 30% above minimum code and owned and leased properties must adhere to LEED and other sustainable building operation guidelines.

CONCLUSION

States play an increasing active role in driving energy policy, at the state level and also at the national level. Because states are leading the Nation in advancing energy efficiency policies and programs, it is important to recognize leadership and document best practices among the states, both to encourage other states to follow, and to encourage federal action to catch up. Toward that end, ACEEE developed this report based on a comprehensive ranking of eight state energy efficiency policies and identified exemplary programs and policies within each policy category.

The table on the next page contains a summary ranking of the states on the eight policy categories included in this study. The "top ten" states, based on their combined scores, are:

1. Vermont, Connecticut, and California (tie)
4. Massachusetts
5. Oregon
6. Washington
7. New York
8. New Jersey
9. Rhode Island and Minnesota (tie)

These top ten states earn scores between 20 and 33 out of a possible 44 points, and the next fifteen states' scores trail fairly moderately behind: all score more than 10 points, up to 17.5 points. The bottom 26 states, however, seriously lag behind the other states, scoring between 0.5 and 10 points.

The "top ten" states with the most robust and diverse efficiency policies offer their citizens more sustainable rates of growth in energy demand; reduced risk of price increases and price volatility; lower total energy bills; reduced risk of blackouts and energy shortages; minimized need for expensive and environmentally damaging energy supply projects; a major stimulus for the state economy; and lower emissions of air pollutants and greenhouse gases.

Some states at the lower end of our rankings have recently begun to take steps to balance their energy markets through new initiatives on energy efficiency. As fossil fuel prices continue to rise and show increased volatility, as the difficulties and costs of building major new supply projects mount, and as environmental "trump cards" such as global warming begin to place a heavier burden on the burning of fossil fuels, we expect more states up and down our ranking scale to turn to energy efficiency as a hedge as well as a good investment in its own right. As states keep on making progress in advancing energy efficiency programs and policies, it continues to be as important as ever to recognize leadership among states.

Summary of State Scoring on Energy Efficiency

Rank	State	Utility Spending on EE	EERS	Combined Heat & Power	Building Codes	Transportation Policies	Appliance Standards	Tax Incentives	State Lead by Example	TOTAL SCORE
	Maximum Points:	*15*	*5*	*5*	*5*	*5*	*3*	*3*	*3*	*44*
1	Vermont	15	5	3	3	4	2	0	1	33
1	Connecticut	11	5	5	4	4	1	2	1	33
1	California	7	5	5	5	3	3	2	3	33
4	Massachusetts	13.5	0	4	2.5	4	2	1	2	29
5	Oregon	11.5	0	4	4	3	2	3	0.5	28
6	Washington	9.5	3	3	4	4	2	1	0.5	27
7	New York	5	0	5	3	5	2	2	3	25
8	New Jersey	7	1	5	2.5	4	1	0	1.5	22
9	Rhode Island	8.5	0	1	4	4	2	0	0.5	20
9	Minnesota	7	3	3	4	2	0	0	1	20
11	Texas	2	5	4	4	1	0	0	1.5	17.5
12	Wisconsin	6.5	0	3	3	2	0	0	2.5	17
13	Iowa	6.5	0	2	4	1	0	0	3	16.5
14	Pennsylvania	0	3	4	4	4	0	0	1	16
15	Colorado	1.5	5	3	3	0	0	1	2	15.5
15	Maine	6.5	0	2	2	4	0	0	1	15.5
15	Hawaii	4.5	3	3	2	1	0	0	2	15.5
18	New Hampshire	7.5	0	1	3	1	0	0	2	14.5
18	Nevada	2	5	2	4	0	0	1	0.5	14.5
20	Maryland	0	0	2	4	4	1	1	2	14
21	Montana	5.5	0	0	4	0	0	3	0.5	13
22	District of Columbia	2.5	0	0	4	1	0	3	2	12.5
23	Arizona	0.5	0	2	3	1	2	1	2	11.5
24	New Mexico	0.5	0	3	4	1	0	1	1.5	11
25	Idaho	3	0	2	4	0	0	1	0.5	10.5
26	Illinois	0	3	2	3	1	0	0	1	10
27	Utah	4.5	0	0	4	0	0	0	1	9.5
27	Ohio	0.5	0	3	4	1	0	0	1	9.5
29	Florida	2.5	0	0	4	1	0	0	1.5	9
30	Delaware	NA	0	3	3	2	0	0	0.5	8.5
30	North Carolina	0	0	2	3.5	1	0	0	2	8.5
30	South Carolina	0.5	0	2	4	0	0	1	1	8.5
33	Michigan	0.5	0	3	1	1	0	0	2	7.5
34	Kansas	0	0	2	4	0	0	0	1	7
35	Nebraska	1.5	0	1	4	0	0	0	0	6.5
35	West Virginia	0.5	0	2	4	0	0	0	0	6.5
35	Kentucky	0.5	0	0	3.5	1	0	0	1.5	6.5
38	Virginia	0	0	2	4	0	0	0	0	6
38	Georgia	0	0	0	4	2	0	0	0	6
40	Louisiana	0	0	0	3.5	0	0	2	0	5.5

Rank	State	Utility Spending on EE	EERS	Combined Heat & Power	Building Codes	Transportation Policies	Appliance Standards	Tax Incentives	State Lead by Example	TOTAL SCORE
41	Indiana	0	0	3	2	0	0	0	0	5
41	Alaska	0	0	2	2	1	0	0	0	5
43	Tennessee	1.0	0	1	1	1	0	0	0	4
44	Oklahoma	0	0	0	2.5	0	0	1	0	3.5
45	Arkansas	0	0	0	3	0	0	0	0	3
46	Missouri	0	0	0	1.5	0	0	0	0.5	2
46	Alabama	0	0	1	0	0	0	0	1	2
48	South Dakota	0.5	0	1	0	0	0	0	0	1.5
49	Mississippi	0	0	1	0	0	0	0	0	1
49	Wyoming	0	0	1	0	0	0	0	0	1
51	North Dakota	0.5	0	0	0	0	0	0	0	0.5

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APPENDIX A. STATE ECONOMIC DATA

We gathered state data on retail electricity prices from the Energy Information Administration (EIA 2006a) and gross state product per capita from material prepared for the U.S. Environmental Protection Agency (Abt Associates 2006). These data are listed in Table A.1, along with 2004 per capita utility spending on energy efficiency, which is presented in Chapter 1, and state rankings from our *Scorecard*.

Table A.1. State Retail Electricity Rates, per capita Gross State Product and per capita Utility Spending on Energy Efficiency

Scorecard RANKING	State	2004 retail electricity prices (cents per kWh)	2001 per capita GSP (thousand$)	2004 per capita Utility EE spending ($)	*Scorecard* Score (out of a possible 44 points)
46	Alabama	6.08	25.1	0.10	2
41	Alaska	10.99	38.7	0.16	5
23	Arizona	7.45	29.0	0.70	11.5
45	Arkansas	5.67	23.7	0.08	3
1	California	11.45	36.5	10.60	33
15	Colorado	6.95	36.0	2.98	15.5
1	Connecticut	10.26	44.6	16.60	33
30	Delaware	7.53	44.9	N/A	8.5
22	District of Columbia	7.47	97.9	3.97	12.5
29	Florida	8.16	27.3	4.14	9
38	Georgia	6.58	32.6	0.15	6
15	Hawaii	15.70	31.7	7.28	15.5
25	Idaho	4.97	27.9	5.03	10.5
26	Illinois	6.80	35.3	0.24	10
41	Indiana	5.58	29.1	0.33	5
15	Maine	9.69	26.5	9.98	15.5
34	Kansas	6.37	29.9	-	7
35	Kentucky	4.63	27.1	1.00	6.5
40	Louisiana	7.13	28.1	0.07	5.5
14	Pennsylvania	8.00	30.5	0.28	16
20	Maryland	7.15	32.6	0.01	14
4	Massachusetts	10.77	41.5	20.81	29
33	Michigan	6.94	29.7	0.79	7.5
9	Minnesota	6.24	35.2	10.95	20
49	Mississippi	7.00	21.5	0.17	1
46	Missouri	6.07	29.7	0.16	2
21	Montana	6.40	22.9	8.63	13
35	Nebraska	5.70	31.2	2.49	6.5
18	Nevada	8.56	33.2	3.63	14.5
18	New Hampshire	11.37	36.0	11.64	14.5
8	New Jersey	10.29	39.1	10.68	22
24	New Mexico	7.10	30.0	1.05	11
7	New York	12.55	40.2	7.63	25
30	North Carolina	6.97	30.1	0.44	8.5
51	North Dakota	5.69	27.9	0.73	0.5
27	Ohio	6.89	30.7	1.41	9.5
44	Oklahoma	6.50	24.8	0.09	3.5
5	Oregon	6.21	36.0	17.51	28

Scorecard RANKING	State	2004 retail electricity prices (cents per kWh)	2001 per capita GSP (thousand$)	2004 per capita Utility EE spending ($)	*Scorecard* Score (out of a possible 44 points)
13	Iowa	6.40	29.7	9.76	16.5
9	Rhode Island	10.96	31.6	12.95	20
30	South Carolina	6.22	26.2	1.17	8.5
48	South Dakota	6.44	30.6	0.70	1.5
43	Tennessee	6.14	29.3	1.86	4
12	Wisconsin	6.88	31.0	9.76	17
27	Utah	5.69	28.0	6.80	9.5
1	Vermont	11.02	29.4	22.54	33
38	Virginia	6.43	33.6	-	6
6	Washington	5.80	33.8	14.26	27
35	West Virginia	5.13	21.7	0.55	6.5
11	Texas	7.95	32.7	3.56	17.5
49	Wyoming	4.98	37.0	-	1
	U.S. Average	7.57	31.4	$ 4.93	12.3
	U.S. Median	6.89	30.6	$ 1.64	10.3

* The District of Columbia's GSP is an outlier, and is therefore not included in the GSP dataset.

These two economic factors, energy prices and GSP, are often used to argue for and/or against state spending on energy efficiency. To assess the association between these variables, we determined the correlation coefficient (r), or the measure of linear correlation, between data in two dimensions: (1) retail electricity prices and per capital utility spending on energy efficiency (Figure A.1); and (2) per capita GSP and per capital utility spending on energy efficiency (Figure A.2). In both cases, there is a positive, but not very strong, correlation between utility sector spending on energy efficiency and prices (r = 0.49) and GSP (r = 0.45). The upper left quadrant of each graph represents states with both lower than average retail electricity prices and GSP (the less favorable economic conditions to motivate spending on efficiency) and yet have higher than average per capita spending on efficiency. The states with both of these characteristics are Idaho, Utah, Iowa, Montana, and Wisconsin.

It is important to recognize that GSP and electricity prices are only two variables among numerous historical, political, social, and economic factors that influence state energy efficiency policies, including utility-sector spending on efficiency programs. We caution that the data presented here on the correlation among variables does not represent a causal relationship, but rather an association, and does not capture the many other factors at play.

Figure A.1. State Retail Electricity Prices and per capita Utility Spending on Energy Efficiency

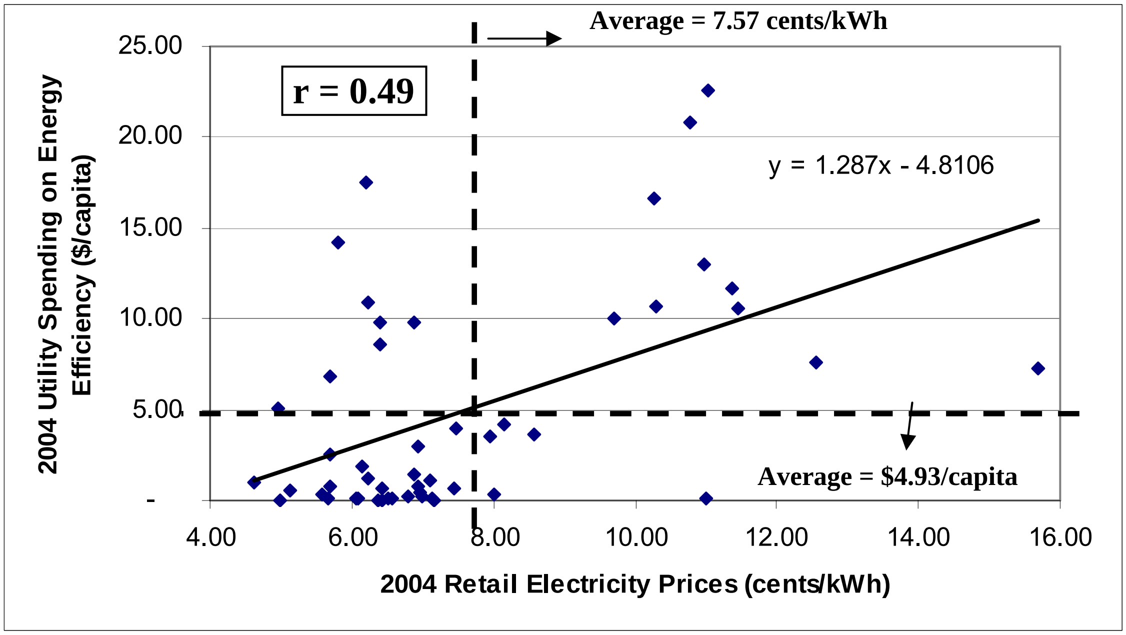
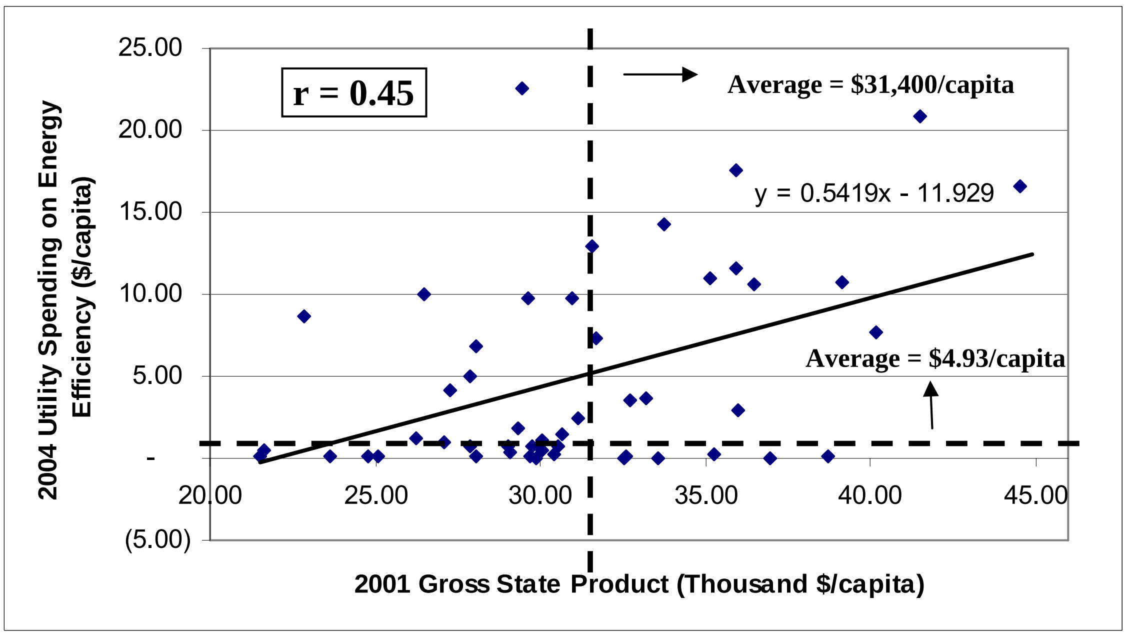


Figure A.2. State per capita GSP and per capita Utility Spending on Energy Efficiency



APPENDIX B. SUPPLEMENTAL DATA

Table B.1. Rankings of Per Capita State Transit Funding

State	FY 2005 Funding	Population Figures	FY 2005 Per Capita Costs	Rank
Massachusetts	$1,197,137,541	6,398,743	$187.09	1
Maryland	$727,433,000	5,600,388	$129.89	2
New York	$2,169,005,000	19,254,630	$112.65	3
New Jersey	$910,584,000	8,717,925	$104.45	4
Alaska	$59,850,000	663,661	$90.18	5
Delaware	$72,600,000	843,524	$86.07	6
Pennsylvania	$835,223,000	12,429,616	$67.20	7
District of Columbia	$211,822,288	3,500,000	$60.52	8
Connecticut	$206,440,541	3,510,297	$58.81	9
Minnesota	$254,527,000	5,132,799	$49.59	10
California	$1,399,800,143	36,132,147	$38.74	11
Illinois	$445,600,000	12,763,371	$34.91	12
Rhode Island	$34,847,617	1,076,189	$32.38	13
Virginia	$157,600,000	7,567,465	$20.83	14
Wisconsin	$109,438,341	5,536,201	$19.77	15
Michigan	$195,149,300	10,120,860	$19.28	16
North Carolina	$154,680,000	8,683,242	$17.81	17
Oregon	$49,585,874	3,641,056	$13.62	18
Vermont	$6,266,976	623,050	$10.06	19
Florida	$149,738,231	17,789,864	$8.42	20
Indiana	$37,046,940	6,271,973	$5.91	21
Wyoming	$2,955,511	509,294	$5.80	22
Tennessee	$34,196,000	5,962,959	$5.73	23
Washington	$30,423,000	6,287,759	$4.84	24
North Dakota	$2,203,657	636,677	$3.46	25
Iowa	$10,140,000	2,966,334	$3.42	26
Arizona	$20,068,000	5,939,292	$3.38	27
South Dakota	$1,891,229	775,933	$2.44	28
Kansas	$6,000,000	2,744,687	$2.19	29
Ohio	$18,300,000	11,464,042	$1.60	30
New Mexico	$2,830,000	1,928,384	$1.47	31
South Carolina	$5,943,000	4,255,083	$1.40	32
Texas	$29,741,067	22,859,968	$1.30	33
West Virginia	$2,258,342	1,816,856	$1.24	34
Maine	$1,555,000	1,321,505	$1.18	35
Missouri	$6,600,000	5,800,310	$1.14	36
Louisiana	$4,962,500	4,523,628	$1.10	37
Arkansas	$2,800,000	2,779,154	$1.01	38
Oklahoma	$3,250,000	3,547,884	$0.92	39
Georgia	$8,222,757	9,072,576	$0.91	40
Nebraska	$1,500,000	1,758,787	$0.85	41
Montana	$415,197	935,670	$0.44	42
Kentucky	$1,400,000	4,173,405	$0.34	43
Mississippi	$800,000	2,921,088	$0.27	44

State	FY 2005 Funding	Population Figures	FY 2005 Per Capita Costs	Rank
Idaho	$312,000	1,429,096	$0.22	45
New Hampshire	$225,000	1,309,940	$0.17	46
Nevada	$95,000	2,414,807	$0.04	47
Alabama	$0		$0	48
Colorado	$0		$0	48
Hawaii	$0		$0	48
Utah	$0		$0	48

Source: BTS 2005b

Note: For the District of Columbia, the total population used is that of WMATA, the Washington Metro Area Transit Authority. This provides a better estimate of population served by the District of Columbia's transit funding.