

# America's Clean Energy Stars

State Actions Leading America to a New Energy Future



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# Table of Contents

Executive Summary .....	4
Introduction .....	8
Clean Energy Leadership in the States .....	10
Renewable Electricity Standards .....	10
Impacts and Benefits .....	12
Star Policies .....	14
Clean Cars Program .....	16
Impacts and Benefits .....	18
Star Policies .....	19
Energy Efficiency Standards and Programs .....	20
Impacts and Benefits .....	22
Star Policies .....	23
Appliance Efficiency Standards .....	25
Impacts and Benefits .....	26
Star Policies .....	27
Building Energy Codes .....	27
Impacts and Benefits .....	28
Star Policies .....	29
America’s Clean Energy Stars .....	31
Gold Star States .....	31
Silver Star States .....	34
Rising Star States .....	34
Zero Star States .....	35
Conclusions and Recommendations .....	36
For Gold Star States .....	36
For Silver Star and Rising Star States .....	37
For Other States .....	37
For the Federal Government .....	37
Notes .....	38

# Executive Summary

States are leading the way toward a new energy future that is healthier for the environment and America's economy. Over the past decade, states have enacted a variety of policies to encourage more efficient use of energy, increase the use of clean renewable energy, and reduce the environmental impact of energy use.

This report highlights state action in five areas of clean energy policy and the benefits of those actions. We give special recognition to a number of states that are providing clean energy leadership for America.

**State clean energy policies are delivering important benefits for America's environment and our economy.**

States have adopted many innovative policies to promote clean energy. Among the most significant of those policies are renewable electricity standards, the Clean Cars Program, energy efficiency standards and programs, energy efficiency standards for appliances, and building energy codes.

## ***Renewable electricity standards***

Renewable electricity standards (RES) require that states increase their use of clean renewable energy from the wind, sun, crops and other sources. RES policies have been adopted by 25 states and the District of Columbia. Those policies will, according to the Union of Concerned Scientists:

- Reduce global warming pollution by approximately 134 million metric tons per year by 2020 – about 2 percent of U.S. carbon dioxide emissions in 2006 or the equivalent of taking more than 21 million cars off the road.
- Result in approximately 55,700 megawatts of new renewable generating capacity in 2020, representing more than 5 percent of America's total electricity generating capacity in 2005.

## ***The Clean Cars Program***

The Clean Cars Program sets strong limits on emissions of smog-forming and toxic pollution from cars and light trucks, as well as emissions of pollutants that cause global warming. In addition, the program requires the sale of increasing numbers of advanced-technology vehicles like hybrids. The Clean Cars Program has been adopted in 12 states and adoption is pending in three others. The program will:

- Reduce global warming emissions from cars and light trucks by approximately 74 million metric tons per year by 2020 – a little over 1 percent of U.S. emissions in 2006 and the equivalent of taking 13.6 million cars off the road.
- Reduce gasoline consumption by up to 8.3 billion gallons per year.

## ***Energy efficiency programs and standards***

States have taken a variety of approaches to tap their vast potential for energy efficiency improvements. If every state were to achieve the energy savings already achieved by the most effective such programs:

- The United States could reduce electricity consumption by about 8 percent compared to business-as-usual levels in 2020.
- The United States could avert 265 million metric tons of carbon dioxide pollution in 2020 (assuming that electricity savings bring about proportional reductions in carbon dioxide emissions from power plants). This amounts to approximately 4 percent of current U.S. carbon dioxide emissions or the equivalent of taking nearly 49 million cars off the road.

- Energy savings well beyond these levels are likely to be feasible and cost-effective. If the United States can use energy efficiency to keep electricity consumption at current levels, the nation could avoid as much as 530 million metric tons of carbon dioxide pollution annually by 2020.

## ***Appliance efficiency standards***

State appliance efficiency standards ensure that the latest, most energy-efficient technologies are included in the products purchased by American families and businesses. Since 2002, 12 states have adopted energy efficiency standards for a variety of appliances, leading the federal government to adopt nationwide standards for some of those products. Combined, the state and federal standards will:

- Reduce carbon dioxide emissions by approximately 64 million metric tons – about 1 percent of total U.S. emissions in 2006 and the equivalent of taking nearly 12 million cars off the road.
- Reduce electricity consumption by more than 84 million megawatt-hours per year, approximately 2 percent of U.S. electricity consumption in 2005 or enough to power 7.4 million American homes.

## ***Building energy codes***

Building energy codes set energy efficiency criteria for residential and commercial buildings, helping to prevent energy waste in buildings. The most up-to-date residential building energy codes have been adopted by 14 states, while the latest commercial codes have been adopted by 17 states. According to the Alliance to Save Energy, if every state adopted current energy codes for residential and commercial structures, regularly

updated them, improved enforcement, and expanded the number of structures covered by codes:

- The United States could reduce carbon dioxide emissions by 50 million metric tons per year by 2020 – about 0.8 percent of total U.S. emissions in 2006 and the equivalent of taking 9 million cars off the road.
- The United States could eliminate the need for 32 new 400-MW power plants.

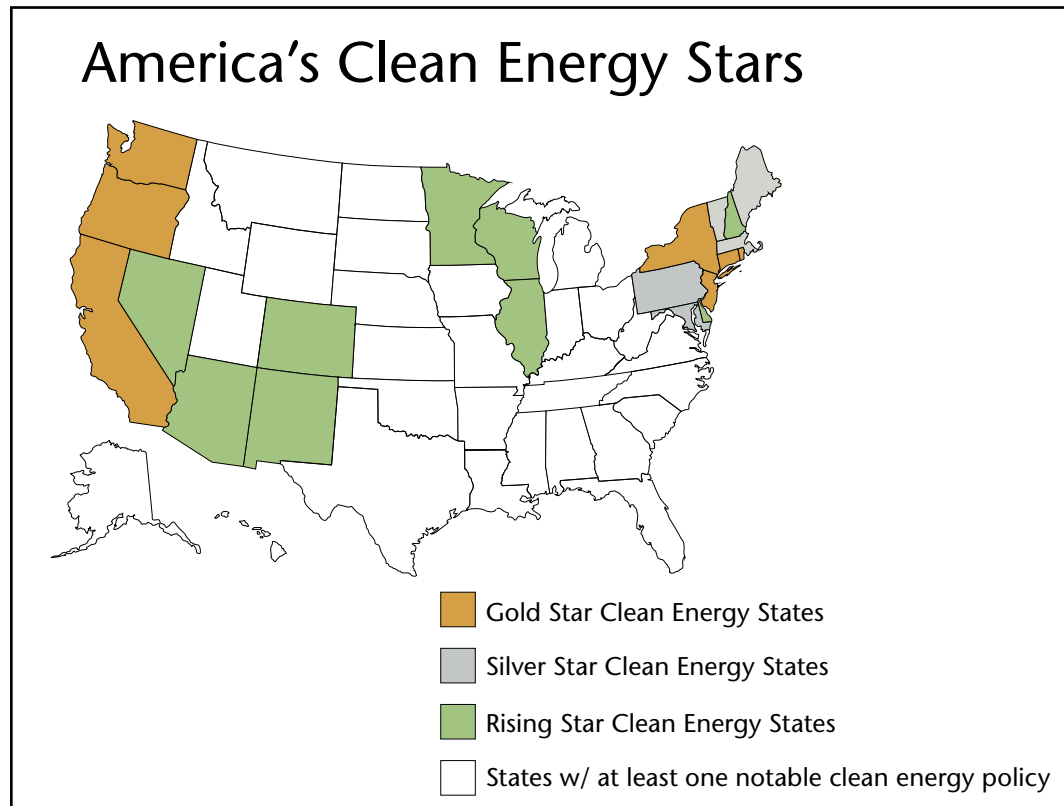
**At least 34 states have adopted meaningful clean energy policies in one of the five categories addressed in this report. Of those states:**

- Seven states – **California, Connecticut, New Jersey, New York, Oregon, Rhode Island and Wash-**

**ington** – receive recognition as “**gold star**” clean energy states for adopting strong policies in at least four of these areas.

- Five states – **Massachusetts, Maryland, Maine, Pennsylvania and Vermont** – are “**silver star**” clean energy states for adopting strong policies in at least two areas and meaningful policies in one to two others.
- Nine states – **Arizona, Colorado, Delaware, Illinois, Minnesota, Nevada, New Hampshire, New Mexico and Wisconsin** – are designated “**rising star**” clean energy states in recognition of their strong recent actions to promote energy efficiency and the use of renewable sources of energy.

Fig. ES-1. America’s Clean Energy Stars



*For a full listing of the states and how their policies were rated, see Table 9, page 32.*

**All states, as well as the federal government, can do more to take advantage of America's clean energy potential.**

- **Gold star states** should continue to innovate by looking for new opportunities to reduce energy use, strengthen building codes and appliance standards, promote renewable energy, and lower global warming emissions from cars. Gold star states must also work to ensure that their ambitious goals for clean energy development are actually met.
- **Silver star and rising star states** should adopt the full complement of clean energy policies described in this report and strengthen the policies they already have on the books.
- **Other states** should follow the example of the clean energy leaders highlighted in this report and adopt strong clean energy policies in each of these five areas.
- **The federal government** should adopt nationwide clean energy policies that build off of the leadership and example set by the states. Those policies should include:
  - Increasing federal fuel economy standards to 40 miles per gallon by 2018, achieving energy savings and global warming pollution reductions surpassing those of the Clean Cars Program.
  - Adopting a federal renewable electricity standard that requires 25 percent of the nation's electricity to come from renewable sources by 2025.
  - Expanding and extending federal tax credits for energy efficient vehicles, buildings and appliances.
  - Adopting new federal appliance efficiency standards and improving the process for adopting standards to maximize cost-effective energy savings.
  - Encouraging and supporting the development of stronger residential and commercial building energy codes.
  - Increasing federal investment in clean energy research and development.



# Introduction

America is too dependent on dirty and dangerous sources of energy. The combustion of coal in power plants, natural gas in homes and businesses, and oil in cars all contribute to air pollution that threatens Americans' health. And the latest climate science tells us that growing consumption of fossil fuels in America and around the world poses a direct and imminent threat to our health, our society, and the survival of species and ecosystems around the globe.

The technology now exists to dramatically reduce our consumption of energy – and the negative environmental consequences of that consumption – while continuing to maintain our economy and a high quality of life. We also have the technology to replace much of the fossil fuels we use with clean, renewable sources of energy.

Breaking America's dependence on fossil fuels will take imagination and bold action. Unfortunately, both have been in short supply in recent years in Washington, D.C. At the federal level, the debate

over energy has often remained locked in the special interest politics of the past. Automakers resist new fuel economy standards for cars. Power plant owners avoid accepting responsibility for the pollution they create. And everybody scrambles for their own slice of the federal energy subsidy pie.

In the states, however, the wheels of change are turning. Elected officials, business leaders, labor unions, farmers, public health experts and environmentalists are coming to recognize that clean air, reliable energy supplies, and a vigorous and healthy economy are not contradictory goals – indeed, all of those goals can be achieved with smart policies that improve the energy efficiency of our economy and promote clean, renewable sources of energy.

Over the last decade, the states, living up to their reputation as “laboratories of democracy,” have crafted and implemented a series of bold, innovative clean energy policies. And those policies are working: renewable energy is booming around the country and the states' redou-

bled efforts to promote energy efficiency are yielding dividends in energy savings and monetary savings for consumers.

While many states have taken some steps to promote clean energy, a few states have taken extraordinary leadership toward a new energy future – setting an example for the rest of the states, and the federal government, to emulate.

This report details the benefits of some of the most important clean energy policy innovations adopted by states over the last decade. It also recognizes states that

have been pioneers in the drive for clean energy, as well as those that have made important progress in recent years.

If America is to meet its mounting environmental and energy challenges, we are going to need smart, creative policy solutions. The states, along with the federal government, should look to the “gold star,” “silver star,” and “rising star” states mentioned in this report for examples of leadership on clean energy policies that can move America toward a new energy future for the 21st century.

# Clean Energy Leadership in the States

America's environment suffers from our reliance on fossil fuels. Air pollution in our cities, the loss of precious natural lands to mining and drilling, and the looming threat of global warming are only a few of the harmful environmental impacts of our current energy system.

In recent years, federal energy policy has too often taken America in the wrong direction, cementing our reliance on fossil fuels through generous tax breaks and other incentives for the coal and oil industries and failing to take advantage of America's vast clean energy potential.

In the states, on the other hand, a clean energy revolution has been taking place. From coast to coast, states have developed and implemented innovative new policies to reduce their dependence on fossil fuels.

Over the past decade, states have implemented a variety of policy approaches to improve the energy efficiency of their states' economies and to expand the use

of clean, renewable sources of energy. This report focuses on five policy approaches that have been adopted by a number of states – all of which have the potential to significantly reduce our consumption of fossil fuels and its environmental impacts.

## Renewable Electricity Standards

**What is it:** *A requirement that a certain percentage of the electricity supplied to consumers come from renewable energy resources.*

**Adopted by:** *25 states and Washington, D.C.*

**Benefits:** *Will avert approximately 134 million metric tons of carbon dioxide pollution per year by 2020.<sup>1</sup> Will result in approximately 55,700 MW of new renewable energy generation by 2020.<sup>2</sup> Projected to spur the creation of “green jobs” across the country.*

America has vast potential to generate electricity from wind, sun, crops and other renewable sources. Renewable energy sources such as wind and solar power do not produce hazardous air emissions, are not subject to unpredictable swings in fossil fuel prices, and have come down in price dramatically over the last several decades. In some cases, renewable energy is even cheaper than power from conventional sources.<sup>3</sup> Moreover, renewable energy technologies are coming to be seen as potent domestic job-creators.<sup>4</sup>

The United States first began a concerted effort to take advantage of renewable energy's potential in the 1970s, as the nation's economy was buffeted by oil price shocks and cost overruns at nuclear power plants, and as Americans first began to recognize the environmental toll inflicted by coal-fired power plants. Initially, the federal government led the charge to develop and promote renewable sources of energy. During the 1970s, the federal government ramped up investment in clean energy research and development programs, boosted tax incentives for renewable energy development, and enacted new utility regulatory policies (such as the Public Utilities Regulatory Policy Act of 1978) – all of which were designed to give a boost to renewable energy technologies.

By the early 1980s, however, federal support for renewable energy research, development and deployment was dramatically scaled back, slowing progress toward affordable renewable energy.

It did not take long before states, seeing the potential value of renewable energy, began to fill the void. In 1983, Iowa became the first state to require utilities to develop specific amounts of renewable energy capacity.<sup>5</sup> Iowa was followed by Minnesota in 1994, which imposed a renewable energy requirement on that state's largest utility as part

of a settlement agreement over the storage of waste from a nuclear power plant.

By the mid to late 1990s, as many states were considering restructuring of their electricity industries in order to encourage competition, some of those states sought to ensure that renewable energy would play an important role in their states' electricity mix well into the future. To achieve this goal, states began to adopt renewable electricity standards (RESs) (sometimes called renewable portfolio standards, or RPSs) as part of their restructuring plans. These standards often differed from the earlier Iowa and Minnesota efforts in that many of the standards required a certain percentage of electricity sold to consumers to come from renewable resources, as opposed to requiring utilities to build a certain amount of renewable generating capacity.

In the years since, states with both restructured and traditionally regulated utilities have come to adopt renewable electricity standards as a way to ensure that their states reap the benefits of renewable energy. Today, 25 states and Washington, D.C. have RESs or functionally similar policies on the books. (See Fig. 1.) Other states, such as Missouri, Vermont and Virginia, have adopted voluntary renewable energy goals.



*Several states have created “carve-outs” in their renewable electricity standards designed to promote the development and use of solar power.*

No two state RES policies are exactly alike. State policies vary in the amount of renewable electricity required, the types of energy that are considered “renewable,” the means of demonstrating compliance with the requirement, and other details. (See “The Ingredients of a Strong RES,” page 14.)

## Impacts and Benefits

State RES policies have already played an important role in promoting renewable energy and reducing pollution from electricity generation.

State RES policies have helped spur the recent expansion in wind energy generation, which has increased nearly sevenfold in the United States since 1996.<sup>7</sup> RES policies were responsible, either in whole or in part, for motivating approximately half of all wind power additions between 2001 and 2006, with the percentage increasing to 60 percent in 2006.<sup>8</sup>

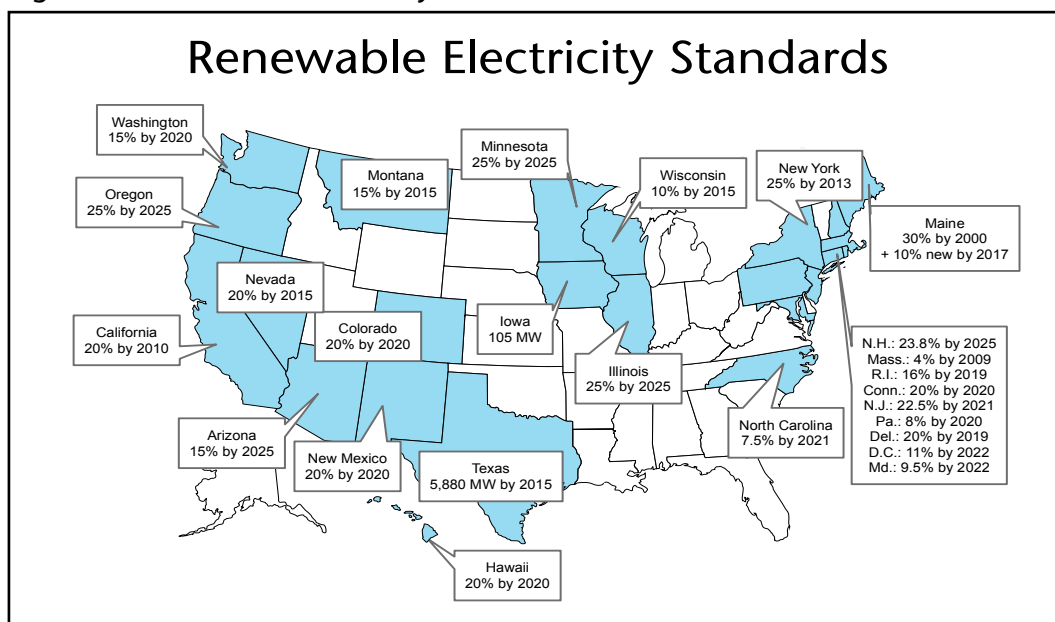
Many RES states are finding themselves at the center of a renewable energy boom. More than 8,500 MW of renewable generating capacity has been installed in states with RES policies since

those policies were adopted. In 2006, more than two-thirds of all new renewable electric generating capacity in the United States was built in RES states. The same trend is likely to hold true in 2007, with more than 70 percent of planned renewable generation capacity expected to be built in RES states.<sup>9</sup> Moreover, of the 20 utilities with the largest purchases of wind power, 17 of them are directly affected by an RES.<sup>10</sup>

Not all new renewable energy capacity, even in RES states, has been driven by RES policies. Voluntary renewable energy purchases by consumers, renewable energy projects supported by state renewable energy funds, and projects built for strictly economic reasons have all helped to contribute to the recent boom in renewable energy. But RES policies have also played a central role.

The new renewable power sources installed in RES states are already delivering environmental benefits. Assuming that renewable energy added in RES states through 2006 would replace combined-cycle natural gas power plants, those additions of renewable energy would avoid an estimated 8.4 million met-

Fig. 1. State Renewable Electricity Standards<sup>6</sup>



ric tons of carbon dioxide emissions each year, equivalent to taking more than 1.5 million cars off America's roads. Renewable generation planned for addition in RES states in 2007 will save an additional 3 million metric tons per year.<sup>11</sup>

The 11.4 million metric tons of carbon dioxide that will be averted by renewable power in RES states by the end of 2007 is equivalent to taking more than 2 million cars off the road for a year.<sup>13</sup> And the savings will only increase over time: the Union of Concerned Scientists estimates that state RES policies will avert 134 million metric tons of carbon dioxide pollution per year by 2020.<sup>14</sup>

In addition, renewable generators built in states that had adopted RES policies through 2006 save an estimated 1.2 billion gallons of water per year. Including generators planned for 2007, the savings increase to nearly 1.9 billion gallons per year. Finally, unlike fossil fuel-fired power plants, most renewable energy technologies produce no emissions of smog-forming or soot-forming pollutants, or of toxic mercury.

The benefits of state RES policies go well beyond the impact on the environment. Indeed, renewable energy is sometimes a less expensive option for meeting electricity needs than conventional coal or gas-fired power plants. And renewable energy is generally more effective at creating jobs and economic benefits than conventional sources of supply. A 2006 study of Arizona, Colorado and Michigan by the National Renewable Energy Laboratory found that wind energy development creates greater direct economic benefits than building new natural gas or coal-fired power plants.<sup>15</sup>

Were an RES to be adopted at the national level, with trading of renewable energy credits permitted across the states, the economic benefits to the United States would be significant. In 2007, the Union of Concerned Scientists (UCS) estimated that a federal RES requiring 20 percent renewable electricity by 2020 would:

- Create 185,000 new jobs from renewable energy development.

**Table 1. Generating Capacity, Water Savings, and Carbon Dioxide Emission Reductions from Renewables Added or Planned in RES States Through 2007<sup>12</sup>**

State	Generating Capacity (MW, summer)	Est. Water Savings (million gallons)	Est. Carbon Dioxide Reductions (metric tons CO <sub>2</sub> /year)
Arizona	15.1	3.4	24,906
California	642.1	195.5	898,759
Colorado	442.5	141.2	543,195
Delaware	7.0	0.0	20,974
Hawaii	40.6	13.2	50,011
Iowa	958.8	307.6	1,197,259
Massachusetts	26.8	1.0	72,556
Maine	49.4	13.6	72,294
Minnesota	871.2	262.4	1,241,152
New Jersey	16.6	2.4	34,594
New Mexico	588.2	189.3	730,978
Nevada	192.0	0.0	443,457
New York	551.3	172.3	714,149
Pennsylvania	246.1	75.6	325,555
Rhode Island	6.0	0.0	17,978
Texas	3646.8	1,168.8	4,561,990
Washington	166.4	45.5	244,899
Wisconsin	79.2	14.3	159,462

- Produce \$66.7 billion in new capital investment; provide \$25.6 billion in income to farmers, ranchers and landowners; and add \$2 billion in local tax revenues.
- Save consumers more than \$10 billion on their electricity and natural gas bills by 2020.<sup>16</sup>

A 2007 study by the energy research firm Wood MacKenzie, using a different model than that employed by UCS, estimated that complying with a federal 15 percent renewable electricity standard would require an additional \$134 billion in capital expenditures between 2006 and 2026. However, by reducing demand for natural gas, and thus lowering wholesale gas prices, the RES would reduce power plant operating costs by \$240 billion, meaning that a federal RES would re-

duce the cost of generating electricity by more than \$100 billion over that time period.<sup>17</sup>

## Star Policies

As noted above, RES policies vary widely in ambition, scope and effectiveness. Because of the complexity of many state RES policies, it is difficult to determine whether a given policy will succeed in achieving its goal for the expansion of renewable energy. As a result, we evaluated state RES policies based only on their stated goals for renewable energy development.

**Gold star** RES policies were deemed to be those that require approximately 15 percent of electricity provided by investor-owned utilities to come from new renewable sources of energy by 2020, or those that put a state on a trajectory

## The Ingredients of a Strong RES

A good RES is more than an ambitious percentage target for renewable energy development. It is a comprehensive policy that maps out a clear vision for renewable energy development in a state and creates the necessary incentives for that vision to be achieved.

The following elements are cornerstones of effective renewable electricity standards that can help ensure that a state achieves the promises laid out in its RES policies.

- **A strong definition of “renewable energy”** – Some state RES policies include forms of energy that are either not “renewable” or that have the potential to inflict significant environmental damage. Renewable electricity standards should only encourage renewable and environmentally responsible sources of energy.
- **Emphasis on new renewable energy** – Some states already have significant renewable energy capacity in the form of hydroelectric dams or electricity generators fueled with biomass. State renewable electricity standards, however, should be designed to achieve more than simply keeping these generators on-line by requiring significant development of new renewable generation.
- **A realistic vision for how new renewable energy capacity will be built** – Simply setting a percentage target for renewable energy isn’t enough; states also need to think through how the RES will actually drive renewable energy development. For example, renewable energy developers often require the stability of long-term contracts to obtain financing for their projects. States can require that a percentage of the renewable energy used to comply with the standards be obtained through long-term contracts.
- **Broad coverage** – An RES policy will do a more effective job of bringing renewable energy on-line if it covers all distribution utilities in a state, including municipal and cooperative utilities.
- **Strong enforcement provisions** – Loopholes and weak enforcement provisions can undermine the ability of RES policies to achieve their goals. Strong RES policies require renewable energy goals to be met in all but the most extreme circumstances and back up those requirements with strong enforcement and penalty provisions.<sup>18</sup>

to achieve that goal. Thirteen state RES policies were determined to meet or approach that goal. Several state RES policies require greater than 15 percent of electricity to come from new resources that are eligible for inclusion in the RES, but define existing renewable generation or other, non-renewable sources of energy as counting toward the goal. Some state policies allow energy efficiency improvements to count toward achievement of the renewable energy goal. For these states, we evaluated only the effectiveness of the RES in promoting new renewable energy development, but we gave these states credit for possessing energy efficiency resource standards, which will be discussed later in this report.

States were awarded a **silver star** for any RES policy that requires new renewable energy development in a state. Only one state, Iowa, has a renewable energy requirement that would result in

no further renewable energy additions in the state. As a result, its policy did not receive a star.

The line dividing gold star and silver star RES policies is not always crystal clear. For example, New York's RES requires that the state achieve 25 percent renewable energy by 2013, of which approximately 19 percent will be satisfied by existing hydroelectric power. The 6 percent new renewables required by 2013 falls short of a trajectory that would achieve 15 percent new renewables by 2020, thus earning New York's RES a silver, rather than a gold star.

Moreover, some state RES policies that earn gold stars in this analysis may have loopholes or other weakening provisions that would reduce their effectiveness in actually achieving their goals. Many RES policies, including some recognized as gold star or silver star policies, have room for improvement.

**Table 2. States with Renewable Electricity Standards<sup>19</sup>**

<b>Gold</b> <i>capable of driving ~15% new renewables by 2020</i>	<b>Silver</b> <i>drives new renewables by 2020</i>
California (20% by 2020)	Arizona (15% new by 2025)
Colorado (20% by 2020 for IOUs; munis & coops have lower targets)	Dist. of Columbia (11% by 2022)
Connecticut (20% Class I by 2020)	Hawaii (20% by 2020, includes existing renewables, CHP and EE)
Delaware (20% by 2020)	Maine (10% new by 2017, plus 30% existing)
Illinois (25% by 2025, includes CHP)	Maryland (9.5% by 2022)
Minnesota (25% by 2025)	Massachusetts (4% by 2009 + option of additional 1%/yr.)
Montana (15% by 2015)	New Hampshire (11.3% new by 2020)
Nevada (20% by 2015, includes existing, 1/4 can be met with EE)	New York (25% by 2013, ~6% new)
New Jersey (20% by 2021)	North Carolina (12.5% by 2021, includes EE)
New Mexico (20% by 2020, IOUs)	Pennsylvania (8% Tier I by 2020)
Oregon (25% by 2025, large utilities)	Texas (5880 MW by 2015, ~5%)
Rhode Island (16% by 2020)	Wisconsin (10% by 2015)
Washington (15% by 2020)	

**Abbreviations:**

CHP = Combined heat-and-power  
 EE = Energy efficiency  
 IOU = Investor-owned utility

Munis = Municipal utilities  
 Coops = Cooperative utilities  
 Class I, Tier I, etc. = Typically the most environmentally preferable sources of energy in an RES.



## Clean Cars Program

**What is it:** *A program that sets tailpipe emission standards for global warming pollutants for cars and light trucks, requires the sale of advanced technology vehicles, and reduces emissions of smog-forming pollutants from light-duty vehicles.*

**Adopted by:** *12 states; pending in three others*

**Benefits:** *Will reduce vehicle carbon dioxide pollution by 74 million metric tons per year by 2020. Will save up to 8.3 billion gallons of gasoline per year by 2020. Will reduce health-threatening air pollution and encourage advanced vehicle technologies.*

In the 1960s, Americans were beginning to become aware of the health threats posed by vehicle exhaust. Nowhere were the problems more severe than in California, whose car-centered transportation system and unique topography and weather conditions made the Golden State the smog capital of America.

California responded to the threat by becoming the first state to regulate pollution from automobile tailpipes. When

the federal government followed suit with its own regulations in the 1970s, Congress recognized California's history of innovation and its unique air pollution problems by giving the state the authority to continue to adopt its own, stronger air pollution standards for cars. Moreover, Congress allowed other states with air pollution problems to choose between federal emission standards and the stronger California standards.

Over the past several decades, understanding of the environmental and public health impacts of automobile pollution has evolved. We now know that smog can impact human health at levels of exposure lower than those previously imagined. And we know that automobile pollution is a major contributor to the build-up of global warming pollutants in the atmosphere – a development that will have major impacts on the environment for generations to come.

California has consistently been quicker to recognize and respond to these new realities than the federal government. By adopting strong standards for smog-forming and other harmful pollutants, California has continued to drive technological advances in emission control. In 1990, California adopted the visionary zero-emission vehicle requirement, which has driven advances in a variety of alternative vehicle technologies. And in 2002, the state became the first to require tailpipe emission standards for pollutants that contribute to global warming. By contrast, the federal government has typically lagged behind California in control of smog-forming pollutants, has done relatively little to promote advanced technology vehicles, and does not yet regulate automobile emissions that contribute to global warming.

California's emission standards for cars and light-duty trucks – known collectively as the Clean Cars Program – include three elements:

*istockphoto.com/Tim McCaig*



*California's ground-breaking emission standards for vehicles have played a significant role in the development of hybrid-electric vehicles and will bring about large reductions in global warming pollution from vehicles in the years to come.*

- The low-emission vehicle (LEV) program, which requires reductions in smog-forming and toxic pollution from vehicles.
- The zero-emission vehicle (ZEV) program, which spurs the introduction of low-polluting, high-technology vehicles into the fleet, such as near-zero emission gasoline cars, hybrid-electric vehicles, and eventually electric or hydrogen fuel-cell vehicles.
- Tailpipe emission standards for global warming pollution.

All three portions of the program will have positive environmental impacts. From the perspective of addressing America's energy challenges, however, the zero-emission vehicle program and global warming emission standards are particularly significant.

**Zero-emission vehicle program** – The zero-emission vehicle (ZEV) program, when originally adopted in 1990, required automakers to produce and sell increasing numbers of electric vehicles over time. The program has been modified in the years since, and is now designed to promote a wide range of advanced vehicle technologies – including ultra-clean gasoline vehicles that release virtually no smog-forming or toxic pollution, hybrid-electric vehicles, electric vehicles and fuel-cell vehicles.

The ZEV program has been an important tool to ensure that automakers continue to “push the envelope” on environmentally friendly technologies. The program's emphasis on the development of batteries and components for electric vehicles helped pave the way for the development of hybrid cars, and the requirements for near-zero emission vehicles have shown that dramatic emission reductions are possible even for gasoline cars.

### **Global warming emission standards**

– In 2002, California adopted legislation requiring limits on global warming pollution emissions from cars and light-duty trucks. The global warming emission standards, which were finalized in 2004 and are scheduled to go into effect for model year 2009, will require automakers to reduce the average amount of global warming pollution produced per mile from their cars, light trucks and SUVs. By model year 2016, new cars will be required to emit 34 percent less global warming pollution on average, and light trucks 25 percent less pollution.<sup>20</sup> These aggressive yet achievable standards will result in significant reductions in global warming pollution.

The exact timing of implementation of the global warming emission standards remains in question. The federal Clean Air Act requires that California receive a waiver from the U.S. Environmental Protection Agency (EPA) before it can enforce its own emission standards for vehicles. Historically, California has been routinely granted these waivers, but in the case of the global warming emission standards, the state has waited more than two years for the EPA to come to a decision. Continued delays in issuing the waiver (or denial of the waiver altogether) could prevent California from enforcing the program on schedule and have a similar impact in other states that have adopted the program.

There are several ways in which automakers can achieve the emission reductions required under the Clean Cars Program. They can choose to produce vehicles that use less fuel per mile driven, they can produce vehicles that run on alternative, low-carbon fuels; and/or they can reduce global warming pollution from sources other than the fuel system (such as air conditioning systems).

## Impacts and Benefits

The low-emission vehicle and zero-emission vehicle programs are already in place in California and several other states that were early adopters of the Clean Cars Program. Tailpipe emission standards for vehicles are scheduled to be implemented beginning with the 2009 model year.

While the Clean Cars Program is in the early phases of implementation, the benefits of the program are likely to be significant. The 12 states that have adopted the Clean Cars Program will cut global warming pollution from cars, light trucks and SUVs by 74 million metric tons per year in 2020.<sup>21</sup> Cumulative emission reductions from the inception of the program through 2020 are even greater, totaling 392 million metric tons of carbon

dioxide (MMTCO<sub>2</sub>) and equivalent to taking 74 million cars off the road for an entire year.<sup>22</sup> The emission reductions in 2020 are equal to a 6.6 percent reduction in today's light-duty vehicle global warming emissions.<sup>23</sup>

The Clean Cars Program could also deliver significant reductions in gasoline consumption. As mentioned earlier, improving the fuel economy of vehicles is just one of several strategies automakers could employ to comply with the program. If they choose to reduce global warming pollution through fuel economy improvements, the Clean Cars Program could save as much as 8.3 billion gallons of gasoline per year by 2020—nearly as much as is consumed by all the vehicles in Florida in a year.<sup>25</sup>

**Table 3. Light-Duty Vehicle Emissions in 2020 from States with Clean Cars Program (MMTCO<sub>2</sub>)<sup>24</sup>**

State	Projected Vehicle Emissions	Emissions With Vehicle Global Warming Pollution Standards	Emission Reduction	Percent Reduction
California	161.7	132.6	29.1	18%
Connecticut	15.1	12.2	2.8	19%
Maine	7.4	6.1	1.3	17%
Maryland <sup>a</sup>	29.3	24.9	4.4	14%
Massachusetts	25.2	20.5	4.6	18%
New Jersey	55.0	45.1	9.9	18%
New York	52.6	43.4	9.1	17%
Oregon <sup>a</sup>	13.0	11.2	1.8	14%
Pennsylvania <sup>a</sup>	49.7	43.7	6.0	12%
Rhode Island	4.4	3.6	0.8	18%
Vermont	3.8	3.2	0.7	17%
Washington <sup>a</sup>	26.2	22.5	3.7	14%
Total	443	369	74	17%

<sup>a</sup> Lower percentage reductions for Maryland, Oregon, Pennsylvania and Washington are likely the result of methodological differences in the studies used to estimate the reductions, not reduced effectiveness of the program in those states. The analysis for these four states assumes that even without the Clean Cars Program, per-mile global warming pollution from vehicles will decline, thus reducing the relative benefit of the program.

Reduced gasoline consumption could also translate into consumer savings at the pump. At today's average fuel prices (\$2.64 to \$3.00 per gallon, depending on the region of the country), consumers could save up to \$23.9 billion at the pump in 2020 as a result of the program.<sup>26</sup> These savings would more than offset the additional cost of vehicles complying with the program. The state of California projects that buyers of new vehicles will save a total of \$41 to \$81 each year due to the standards—and that is assuming gasoline costs only \$1.74 per gallon.<sup>27</sup>

At the same time, through the low-emission vehicle (LEV) portion of the program, the Clean Cars Program will reduce emissions of smog-forming and toxic air pollutants. A 2005 study conducted by Northeast States for Coordinated Air Use Management (NESCAUM) estimated that “early adopters” of the LEV program in the Northeast would experience a 16 percent reduction

in light-duty vehicle emissions of smog-forming nitrogen oxides by 2025 and an 8 percent reduction in emissions of volatile organic compounds (VOCs) compared with federal emission standards. “Late adopters” (those who adopted the program after 2003) would experience 15 percent reductions in nitrogen oxide emissions and 7 percent reductions in VOCs.<sup>28</sup>

## Star Policies

States face two choices when adopting air pollution standards for vehicles: federal standards or those in place in California. Federal law prohibits states from adopting their own standards that would result in automakers having to produce a “third car.”

**Gold star** states, therefore, are those that have adopted the Clean Cars Program. Two states – Pennsylvania and Washington – have not adopted the zero-emission vehicle portion of the program. While the ZEV program is an important part of the Clean Cars Program and should be adopted by all participating states, the impact of the global warming emission standards is so significant as to merit all states adopting that portion of the program receiving a gold star.

The governors of three states – Arizona, Florida and New Mexico – have issued executive orders directing administrative agencies to implement the Clean Cars Program in their states. While these rulemakings are not finalized, the three states with pending Clean Cars Program adoption are recognized with **silver stars**.

**Table 4. States with Clean Cars Program**

<b>Gold</b> <i>Have adopted program</i>	<b>Silver</b> <i>Program pending adoption</i>
California	Arizona
Connecticut	New Mexico
Massachusetts	Florida
Maryland	
Maine	
New Jersey	
New York	
Oregon	
Pennsylvania*	
Rhode Island	
Vermont	
Washington*	

\* Pennsylvania and Washington have not adopted the zero-emission vehicle portion of the program.

## Energy Efficiency Standards and Programs

**What is it:** *Programs or standards that increase the use of energy efficiency measures in homes, business and industry.*

**Who has adopted it:** *At least 31 states have adopted some form of energy efficiency requirement or funding mechanism for energy efficiency programs.*

**What will it do:** *Tap cost-effective energy efficiency potential throughout the economy. The most ambitious programs target electricity and natural gas savings of as much as 15 percent over the next decade.*

The cheapest, fastest, cleanest way to reduce our dependence on fossil fuels is to use energy more efficiently. There are vast opportunities to improve the energy efficiency of our economy. The American Council for an Energy-Efficient Economy (ACEEE), the nation's foremost independent experts on energy efficiency, surveyed the results of a number of studies estimating the potential for cost-effective energy efficiency savings in 2004. On average, the studies identified cost-effective energy efficiency opportunities sufficient



*State-run and utility-run energy efficiency programs promote sensible, cost-effective measures to reduce energy consumption, such as replacing energy-wasting incandescent light bulbs with compact fluorescents. Photo: Matthew Bowden*

to cut electricity use by 20 percent and natural gas use by 22 percent.<sup>29</sup>

States have a variety of policy options to improve the energy efficiency of their economies, with the number of policy innovations multiplying in recent years as states seek out new ways to tap this vast and inexpensive resource.

Most state efforts to date can be boiled down into three strategies:

- 1) Changes to utility energy procurement rules that require utilities to take advantage of cost-effective energy efficiency resources before expanding conventional sources of supply.
- 2) Creation of energy efficiency programs (or, in some cases “clean energy utilities”) funded in whole or in part by levies on ratepayers’ utility bills (known as “systems benefit charges”).
- 3) Establishment of hard targets for the amount of energy efficiency that must be achieved by utilities.

These three strategies are distinct, but often interrelated. For example, a state public utility commission may require utilities to purchase all cost-effective energy efficiency, and then oversee a planning process to establish a specific and enforceable energy savings goal. Or, a commission could set the level of funding for energy efficiency programs based on the amount of funding believed to be necessary to achieve a certain level of energy savings.

Energy efficiency policies are also often linked to other clean energy policies. As noted above, several state renewable electricity standards allow energy efficiency improvements to count toward compliance with renewable energy goals.

States’ current efforts to promote energy efficiency trace their roots back

to the 1980s, a time when rising fossil fuel costs and staggering cost overruns for nuclear power plants drove public officials and utility regulators to reconsider traditional assumptions about the role of utilities and the best choices for meeting energy needs. That period saw the rise of Integrated Resource Planning, in which utilities were called upon to develop long-range, least-cost plans for satisfying energy needs that considered all possible resources, including improvements in energy efficiency. Seeing the potential for cost savings, regulators began to require utilities to implement energy efficiency programs, paid for in utility rates.

By 1993, electric utilities were spending approximately \$1.8 billion per year on “demand-side management” programs, which include energy efficiency programs.<sup>30</sup> However, as states began to deregulate their electricity industries in the 1990s, and amid an atmosphere of low prices for fuels such as natural gas, investment in energy efficiency programs lagged. Between 1993 and 1998, spending on electric utility demand-side management programs fell by nearly half in nominal dollar terms.<sup>31</sup>

Since the late 1990s, however, as energy costs have skyrocketed and increasing demand has sparked calls for costly investments in energy infrastructure, new attention has been paid to energy efficiency efforts. Energy efficiency is now commonly recognized and widely accepted as a low-cost way to address energy needs. Market forces alone, however, won’t do the job of maximizing the energy efficiency of America’s economy – substantial market barriers exist that have thus far prevented energy efficiency from playing as large a role in America’s energy picture as is economically justified.

As a result, the last decade has seen the expansion of many utility-run and state-run energy efficiency programs, as

well as the development of new programs and policy tools designed to maximize energy efficiency. Among those tools are the following:

### **Utility-Run and Systems Benefit Charge-Supported Efficiency Programs**

These programs are the mainstays of many states’ energy efficiency efforts. They are generally funded either through utility rates or through a special “systems benefit charge” on ratepayers’ electricity bills. These energy efficiency programs may either be run by utilities themselves, by state agencies, or by independent contractors, and they generally include a variety of programs aimed at residential, commercial and industrial customers, ranging from home energy audits to rebates on energy-efficient appliances to technical and financial assistance for building retrofits.

### **Energy Efficiency Resource Standards**

Energy efficiency resource standards, or EERSs, are requirements that utilities achieve specific energy efficiency targets. They are the energy efficiency equivalents of renewable electricity standards and are often set to achieve a percentage reduction in energy consumption or consumption growth. EERS policies often require utilities to invest in energy efficiency programs in much the way they would purchase renewable energy to comply with an RES.

### **Utility Energy Procurement Rules**

In theory, every state with traditionally regulated utilities has the power to require those utilities to pursue cost-effective energy efficiency opportunities as part of the mandate to ensure that electricity and natural gas is delivered to consumers at the least possible cost.

Several states that undertake rigorous integrated resource planning have long required utilities to operate energy efficiency programs, with funding for those programs coming from utility rates. However, several states – including some states that restructured their electricity industries in the 1990s – have recently made this requirement more explicit by adopting laws or regulations requiring utilities to tap all cost-effective energy efficiency opportunities before expanding conventional supplies.

The most well-known of these efforts is California’s “loading order” for electric utilities, which was adopted in the wake of the state’s disastrous 2000-01 energy crisis. The loading order gives energy efficiency first preference when utilities develop their plans for how to meet the state’s electricity needs. In the wake of California’s decision, several states, including Connecticut and Rhode Island, adopted electricity system reforms that give preference to energy efficiency as a solution, while others, such as Washington, have explicitly required that utilities pursue all cost-effective energy efficiency opportunities.

### **Energy Efficiency Utilities**

A more recent innovation is the development of energy efficiency or clean energy “utilities.” The first such organization, Efficiency Vermont, was established in 2000 to unite the energy efficiency programs formerly provided by the state’s electric utilities under one roof. Efficiency Vermont is not a state agency, but is an independent non-profit that was chosen to operate the state’s energy efficiency programs through a competitive selection process, and receives its funding from a systems benefit charge on consumers’ electricity bills. Unlike electric utilities, Efficiency Vermont focuses only on delivering energy efficiency services to Vermonters and the program must

regularly demonstrate its effectiveness to receive renewal of its contract.

The state of Delaware recently took the concept of an energy efficiency utility one step farther with the passage of legislation to create a “sustainable energy utility.” Like Efficiency Vermont, the Delaware sustainable energy utility will be managed by an independent non-profit selected through competitive bidding. Unlike Efficiency Vermont, however, the utility is designed to be a self-sustaining entity that finances itself by recapturing a portion of the savings resulting from energy efficiency measures and a portion of the revenues from the sale of renewable energy certificates from projects assisted by the utility. The utility will be supported by a systems benefit charge, but the charge will be used to service bonds that will be issued to finance the utility’s initial capital needs. The Delaware utility is also novel because it will also support energy efficiency and clean energy efforts in the transportation sector.<sup>32</sup>

### **Impacts and Benefits**

Ratepayer-supported energy efficiency programs have made a measurable impact in reducing America’s demand for energy. Energy efficiency programs saved more than 47,000 gigawatt-hours of electricity in 2005, representing approximately 1 percent of U.S. electricity consumption.<sup>33</sup> Natural gas efficiency programs, while not as widespread, saved 161 million therms of gas in 2005, about one-tenth of 1 percent of annual U.S. consumption.<sup>34</sup>

Those programs also delivered large cost savings to consumers. The retail value of electricity saved through the programs in 2005 was more than \$35 billion, with residential consumers saving approximately \$13 billion and commercial and industrial consumers saving approximately \$22 billion. Natural gas



consumers saved an additional \$212 million.<sup>35</sup>

Other energy efficiency efforts have succeeded as well. Texas' energy efficiency resource standard, adopted in 1999, initially called for energy efficiency measures sufficient to offset 10 percent of projected load growth. These savings were consistently achieved at low cost, prompting the Texas Legislature to increase the target to 20 percent of load growth and consider higher targets in the future.<sup>36</sup> Vermont's energy efficiency utility, Efficiency Vermont, has also met with success. Energy efficiency improvements delivered by the program in 2006 alone sliced projected load growth in half and will provide Vermont with \$18.9 million in net economic benefits over their lifetimes. Efficiency Vermont estimates that by 2006, energy efficiency savings delivered by the program accounted for 5 percent of Vermont's electricity needs, enough to make the program the state's fifth-largest utility.<sup>37</sup>

Because of the diversity of state energy efficiency efforts and the rapid innovation in the energy efficiency field, it is impossible to arrive at an accurate projection of future benefits from these programs. If, however, the entire nation were to achieve similar energy efficiency savings to those delivered thus far by Efficiency Vermont (a 50 percent reduction in load growth), the impact would be significant:

- The United States would save 386 billion kilowatt-hours of electricity by 2020 compared to business as usual, or about 10 percent of the electricity consumed in the United States today or 8 percent of projected electricity use in 2020.<sup>38</sup>
- Assuming that carbon dioxide emissions are reduced in proportion to electricity consumption, U.S. carbon dioxide emissions would fall by 265

million metric tons compared to what they would have been under business-as-usual.<sup>39</sup>

If the nation were to use energy efficiency to meet all of its future growth in electricity demand – a target that is eminently achievable given America's vast potential for energy efficiency improvements – the benefits would be even greater. The nation would save approximately 772 billion kilowatt-hours of electricity by 2020, while reducing carbon dioxide emissions by approximately 530 million metric tons compared with business-as-usual.<sup>40</sup>

There is reason to believe that even further reductions in energy consumption are feasible and cost-effective. New York state, for example, is developing plans to implement an energy efficiency resource standard that would reduce total projected electricity use by 15 percent by 2015. Initial estimates suggest that this goal can not only be achieved, but can be achieved at a net benefit to the state's economy of \$12 billion.<sup>41</sup> It is not unreasonable to believe that energy efficiency strategies can be developed that will hold demand for electricity constant at current levels – or even reduce consumption in absolute terms – given the continued improvement in energy efficiency technologies and the rising price of energy.

## Star Policies

As with renewable electricity standards, there is great variety among states' policies and programs to promote energy efficiency.

**Gold star** programs were defined as those in which a state devotes more than 2 percent of electric utility revenue to energy efficiency. States may also earn a gold star if they devote a smaller share of electric utility revenue to energy efficiency but have other significant policies



to promote energy efficiency, including significant systems benefit charge-funded programs for natural gas energy efficiency (spending more than \$2 per capita in 2006), energy efficiency resource standards, or utility rules that mandate or give preference to energy efficiency.

**Silver star** programs are those in which a state devotes at least 1 percent of electric utility revenue or has adopted

(or is in the process of adopting) other significant policies to promote energy efficiency.

A few states have systems benefit charge-supported energy efficiency programs that allow for only small investments in energy efficiency. These states were not recognized with either a gold or a silver star.

**Table 5. States with Energy Efficiency Programs and Standards<sup>42</sup>**

<b>Gold</b> <i>&gt;2% of electric utility revenues to energy efficiency and/or other policy</i>	<b>Silver</b> <i>&gt;1% of electric utility revenues to efficiency, or other policy</i>
California (A, b, C, d)	Colorado (C)
Connecticut (A, c, d)	Delaware (e)
Iowa (a, b)	Hawaii (c)
Massachusetts (A, b)	Idaho (a)
Maine (A, d)	Illinois (C)
Minnesota (a, b, C)	Montana (a)
New Jersey (a, b, C)	North Carolina (c)
Nevada (a, c)	New Hampshire (a)
New Mexico (a, d)	Pennsylvania (c)
New York (a, C)	Texas (C)
Oregon (a, b)	Virginia (C)
Rhode Island (a, d)	
Utah (A)	
Vermont (A, b, C)	
Washington (A, C, d)	
Wisconsin (a, b)	

**Key:**

- A = Energy efficiency programs > 2% of utility revenues
- a = Energy efficiency programs > 1% of utility revenues
- b = Natural gas efficiency program > \$2 per capita
- C = Freestanding energy efficiency resource standard
- c = Energy efficiency standard incorporated in RES
- d = Preference or mandate for energy efficiency in utility procurement
- e = Sustainable energy utility
- bold** = Policy pending

## Appliance Efficiency Standards

**What is it:** *Mandatory minimum energy efficiency standards for residential or commercial appliances.*

**Who has adopted it:** *12 states have adopted standards for at least some products. Plus, state action led Congress to require federal efficiency standards for a number of appliances in the 2005 Energy Policy Act.*

**What will it do:** *Save at least 84 million megawatt-hours of electricity per year by 2020 (including federal standards adopted after state action), about 2 percent of U.S. electricity consumption. Avoid 64 million metric tons of carbon dioxide emissions by 2020. Save nearly 500 billion cubic feet of natural gas annually by 2020.*

There are great opportunities to improve the energy efficiency of the appliances in American homes and the equipment used by American businesses. One of the most effective ways to take advantage of those opportunities is by requiring that new appliances meet strong standards for energy efficiency.

As with many clean energy innovations, California pioneered energy efficiency standards for appliances in the 1970s.<sup>43</sup> California's energy efficiency standards for refrigerators, which were supplanted by federal standards that took effect in 1990, are among the great energy efficiency success stories of recent years. Refrigerators are the leading energy-consuming appliances in most American homes, accounting for 14 percent of residential electricity use.<sup>44</sup> As a result of California's early efficiency standards for refrigerators, the subsequent federal standards, and the steady tightening of standards over time, the average refrigerator sold today uses one third as much electricity as the average unit from 1974, despite an increase in average size and performance.<sup>45</sup> A 1998 study by Lawrence Berkeley National Laboratory estimated that the first two

rounds of federal refrigerator efficiency standards, implemented in 1990 and 1993, would deliver 79 million metric tons of cumulative carbon dioxide emission reductions by 2010 and save consumers approximately \$8 billion in that same time frame.<sup>46</sup>

Following California's lead, several states adopted appliance efficiency standards before the first federal standards were adopted in 1987. But while federal standards have the potential to deliver large energy savings, and while Congress has repeatedly called for stronger standards for some appliances, the federal government has missed tremendous opportunities for energy savings by delaying the process for adopting new standards. A 2007 report by the U.S. Government Accountability Office found that the U.S. Department of Energy missed 34 congressional deadlines for setting new appliance efficiency standards, with some of the delays lasting as long as 15 years. The financial cost of those delays was estimated to reach \$28 billion in foregone energy savings by 2030. The delays are estimated to contribute approximately 53 million tons of carbon dioxide emissions and waste enough electricity to power 20 million American households.<sup>47</sup>

As a result of this federal inaction, states have once again taken up the role of pioneers, developing and implementing new appliance efficiency standards for products the federal government has yet to address. In addition, some states have pushed the envelope by pushing for stronger standards for products already regulated by the federal government.

The recent state action on efficiency standards has come in two waves. The first wave began in 2002 and ended with the enactment of the federal Energy Policy Act in 2005. Ten states adopted standards for a variety of consumer products, including ceiling fans, commercial clothes washers, exit signs, torchiere lamps and

traffic signals.<sup>48</sup> The momentum toward stronger state-by-state efficiency standards culminated with Congress' agreement to require stronger standards for most of those products nationally. As with many other clean energy innovations, state action prepared the way for the federal government to follow suit.

Since 2005, states have begun to consider adoption of standards for a range of products not covered by the 2005 Energy Policy Act. Those products include commercial hot food holding cabinets and walk-in refrigerators and freezers. Several states that adopted earlier rounds of efficiency standards have subsequently adopted standards for these products.<sup>49</sup>

In addition, in 2007, the state of Nevada became the first state to adopt energy efficiency standards for general service light bulbs. The state's new standard effectively bans incandescent light bulbs in favor of higher efficiency compact fluorescents.

## Impacts and Benefits

As noted above, states' actions to implement appliance efficiency standards during the early 2000s resulted in the subsequent adoption of federal standards for many of these products. The American Council for an Energy-Efficient Economy (ACEEE) estimates that the appliance standards in the 2005 Energy Policy Act will save approximately 76 million megawatt-hours of electricity annually by 2020 (about 2 percent of total U.S. electricity use in 2005), along with 494 billion cubic feet of natural gas (about 2 percent of total U.S. natural gas consumption in 2005).<sup>50</sup> The standards can be expected to reduce carbon dioxide emissions by approximately 58.3 million metric tons by 2020 and save consumers approximately \$7 billion.<sup>51</sup>

The savings expected among states that have adopted standards not included in the 2005 Energy Policy Act are also significant. Those states can expect to

**Table 6. State-by-State Savings from Appliance Efficiency Standards<sup>52</sup>**

	Electricity (MWh)	Natural Gas (million cubic feet)	Carbon Dioxide (1,000 metric tons)
Arizona	247,200		138
California	4,294,200	1,051	3,806
Connecticut	317,100		255
Maryland	662,700		573
Massachusetts	723,100	1,004	431
New York	1,632,275		520
Oregon	363,400		260
Rhode Island	68,800	207	77
Vermont	78,450	396	77
Washington	414,700		297
<b>TOTAL</b>	<b>8,801,925</b>	<b>2,658</b>	<b>6,434</b>

**Table 7. States with Appliance Efficiency Standards<sup>55</sup>**

<b>Gold</b> <i>multiple products</i>	<b>Silver</b> <i>other</i>
Arizona (12 products)	Nevada (light bulbs)
California (23 products)	
Connecticut (17 products)	
Massachusetts (7 products)	
Maryland (17 products)	
New Jersey (8 products)	
New York (16 products)	
Oregon (17 products)	
Rhode Island (20 products)	
Vermont (6 products)	
Washington (12 products)	

save more than 8.8 million additional megawatts of electricity and 2.7 billion cubic feet of natural gas annually by 2020, while reducing carbon dioxide emissions by an additional 6.4 million metric tons.<sup>53</sup> These savings do not include the impact of Nevada’s light bulb efficiency standards, which will eventually save 1.2 million megawatt-hours of electricity per year and reduce carbon dioxide emissions by 850,000 tons annually.<sup>54</sup>

**Star Policies**

**Gold star** policies were recognized as those that included energy efficiency standards for multiple products – including standards that were adopted prior to the Energy Policy Act of 2005. A **silver star** was given to Nevada in recognition of that state’s efforts to impose energy efficiency standards for light bulbs.

**Building Energy Codes**

**What it is:** *Codes governing the construction of residential and commercial buildings to ensure that they meet minimum standards for energy efficiency.*

**Adopted by:** *Most states have adopted some form of building energy code. Fourteen*

*states have adopted the most recent residential building energy code, while 17 states have adopted the most recent commercial energy code.*

**What it will do:** *Nationwide adoption of the most recent residential and commercial building codes (along with consistent updates and broader application of those codes and improved enforcement) would save 5 quadrillion BTU of energy by 2020, about 5 percent of current annual U.S. energy consumption, reduce annual carbon dioxide emissions by 50 million metric tons, and reduce consumers’ energy bills by \$7 billion.*

Building codes were originally intended to ensure the safety of residential and commercial construction. In recent years, however, building codes have been used to reduce the amount of energy wasted in heating, cooling, lighting and the use of electrical equipment. Because residential and commercial buildings can last for ‘the most recent residential and commercial building energy codes that have been determined by the U.S. Department of Energy to save energy (or, in the case of residential codes, to explain in writing why they have not adopted the most recent code).<sup>58</sup> Currently, 40 states have statewide commercial and

residential building energy codes, while several others with no statewide code have seen significant adoption of codes by municipalities.<sup>59</sup>

The most recent residential model building energy codes are the 2006 International Energy Conservation Code (IECC) and 2006 International Residential Code (IRC), while the most recent model commercial codes are the 2006 IECC code and ASHRAE Standard 90.1-2004. (ASHRAE stands for the American Society of Heating, Refrigerating and Air-conditioning Engineers.) These model energy codes are regularly updated, often on a set schedule. States may adopt these codes, adopt the codes with state-specific modifications, or adopt their own building energy codes. Many, though not all states, revise and update their codes on a set timeline; for example, every three years.

There are currently 14 states that have adopted either the 2006 IECC or 2006 IRC code, or a stronger state-specific code, for residential structures.<sup>60</sup> In addition, there are 17 states that have

adopted the most recent commercial energy codes.

## Impacts and Benefits

The energy savings attributable to updating to modern building energy codes is difficult to estimate for several reasons. First, the savings achieved by building codes overlap to a certain extent with the savings achieved through appliance efficiency standards. Second, because building codes are typically enforced by local governments, the degree to which codes are actually enforced varies a great deal from state to state and town to town. Finally, building energy codes set requirements for a variety of systems within homes and commercial buildings and evaluating the energy savings impact of each code change is challenging.

However, it is clear that adoption and enforcement of modern building codes can save large amounts of energy and money. California estimates that its building energy codes and appliance efficiency standards have saved consumers more than \$56 billion in electricity and natural gas costs since 1975 and that the codes and standards will save an additional \$23 billion by 2013.<sup>61</sup> Nationally, commercial and residential building energy codes were estimated to have saved about 0.5 quadrillion BTU of energy in 2000 (approximately one-half of 1 percent of current total U.S. energy use).<sup>62</sup>

Nationwide adoption of the most recent residential and commercial building codes – along with consistent updates, broader application of those codes and improved enforcement – would save a cumulative 5 quadrillion BTU of energy by 2020 (about 5 percent of current U.S. energy use), reduce annual carbon dioxide emissions by 50 million metric tons, and reduce consumers' energy bills by \$7 billion.<sup>63</sup>

DOE/NREL, Karen Doherty



*Building energy codes ensure that residential and commercial structures meet modern standards for energy efficiency.*

While adoption of residential and commercial building energy codes can help maximize energy savings from buildings, codes ought to be the floor, rather than the ceiling, for acceptable energy efficiency performance in buildings. Indeed, in recent years there has

### Advanced Building Codes

Across the country, states and cities are taking leadership in pushing for advanced building codes that produce energy savings well beyond those delivered by today's model codes.

In Texas, the city of Austin, which is nationally known as a clean energy leader, is expected to commit to reducing energy consumption in new homes by 65 percent by 2015 through a series of building code revisions. The first round of revisions, to go into effect at the beginning of 2008, is expected to reduce energy consumption in new homes by 11 percent.<sup>64</sup>

In 2006, the U.S. Conference of Mayors adopted the "2030 Challenge" – a commitment to work toward making all new buildings "carbon neutral" by 2030 through enhanced energy efficiency and the use of renewable energy.<sup>65</sup> The challenge has been driven by the architectural community and embraced by a variety of city governments and other leaders.

State and local governments have also sought to make it easier to install renewable energy. In 2007, the state of New Mexico enacted legislation requiring that the state's building codes and standards ensure that new buildings are "solar ready."<sup>66</sup> As part of its landmark "million solar roofs" legislation, enacted in 2006, California will require that solar panels be offered as an option on new homes.<sup>67</sup>

been an increasing push both to take new construction "beyond code" and to create more ambitious energy-saving building codes. (See "Advanced Building Codes.") The federal government's "Energy Star Homes" program, for example, applies the Energy Star label to new homes that reduce energy consumption by at least 15 percent compared with the 2004 IRC.<sup>68</sup> In 2006, 10 states (Alaska, Arizona, Connecticut, Delaware, Hawaii, Iowa, Nevada, New Jersey, and Vermont) saw more than 20 percent of their new homes meet Energy Star standards.<sup>69</sup> Ratepayer-supported energy efficiency programs in many states have played an important role in promoting the purchase of Energy Star homes. Meanwhile, the U.S. Green Building Council, ASHRAE and others are working to develop a new standard for "green" commercial buildings that can be adopted into building codes. The goal is to achieve a code that reduces energy costs and carbon dioxide emissions by 30 percent relative to the most recent ASHRAE code.<sup>70</sup>

### Star Policies

**Gold star** states are those that have adopted both the most recent residential and commercial model building energy codes, or state codes at least as strong as the model codes. **Silver star** states have adopted either the most recent residential code or the most recent commercial code, but not both.

It should be noted that many states operate on regular code revision cycles, for example, every three years. In some cases, states may be planning to update their codes to the most recent model codes during their next code revision cycle, but have not yet done so. These states are not recognized here.

**Table 8. States with Updated Building Energy Codes<sup>71</sup>**

<b>Gold</b> <i>updated residential and commercial codes</i>	<b>Silver</b> <i>updated residential or commercial code</i>
California (R, C)	Alaska (R)
Florida (R, C)	Maine (C)
Iowa (R, C)	North Carolina (C)
Kentucky (R, C)	New Jersey (C)
Louisiana (R, C)	Rhode Island (R)
Maryland (R, C)	Virginia (C)
New Hampshire (R, C)	Vermont (C)
Ohio (R, C)	
Oregon (R, C)	
Pennsylvania (R, C)	
Utah (R, C)	
Washington (R, C)	

**Key:**

R = updated residential building energy code

C = updated commercial building energy code

# America's Clean Energy Stars

Over the past decade, states have taken leadership in many areas of energy policy. State leadership and innovation on energy policy has been both broad and deep. At least 34 states and the District of Columbia have adopted gold star or silver star policies in at least one of the five areas discussed in this report. (See Table 9.)

Some states, however, have shown exceptional leadership. In this section, we recognize three categories of state leaders.

- **Gold star** states have adopted gold star policies in at least four of the five areas discussed here.
- **Silver star** states have adopted gold star policies in at least two areas, along with silver star policies in another one to two areas.

- **Rising star** states are those that have adopted significant clean energy policies in at least one area since the beginning of 2006 and have gold or silver star policies in at least two areas.

## Gold Star States

Seven states achieved gold star status. They are:

**California** – Since the mid-1970s, California has been the nation's leader in clean energy policy. The state has played a pioneering role in many of the areas of clean energy policy discussed here, initiating the Clean Cars Program, adopting the nation's first energy efficiency standards for appliances, and implementing the nation's first building energy codes. California has cemented its reputation



Table 9. Clean Energy Policy Adoption in the States

	Renewable Electricity Standards	Clean Cars Program	Energy Efficiency Programs	Appliance Efficiency Standards	Building Energy Codes
<b>Gold Star Clean Energy States</b>					
CA	Gold	Gold	Gold	Gold	Gold
OR	Gold	Gold	Gold	Gold	Gold
WA	Gold	Gold	Gold	Gold	Gold
NJ	Gold	Gold	Gold	Gold	Silver
RI	Gold	Gold	Gold	Gold	Silver
CT	Gold	Gold	Gold	Gold	
NY	Silver	Gold	Gold	Gold	
<b>Silver Star Clean Energy States</b>					
MA	Silver	Gold	Gold	Gold	
MD	Silver	Gold		Gold	Gold
VT		Gold	Gold	Gold	Silver
ME	Silver	Gold	Gold		Silver
PA	Silver	Gold	Silver		Gold
<b>Rising Star Clean Energy States</b>					
NM	Gold	Silver	Gold		
NV	Gold		Gold	Silver	
MN	Gold		Gold		
NH	Silver		Silver		Gold
AZ	Silver	Silver		Gold	
CO	Gold		Silver		
DE	Gold		Silver		
IL	Gold		Silver		
WI	Silver		Gold		
<b>States with at Least One Gold or Silver Star Clean Energy Policy</b>					
IA			Gold		Gold
UT			Gold		Gold
MT	Gold		Silver		
NC	Silver		Silver		Silver
FL		Silver			Gold
HI	Silver		Silver		
TX	Silver		Silver		
VA			Silver		Silver
KY					Gold
LA					Gold
OH					Gold
AK					Silver
DC	Silver				
ID			Silver		
<b>States with No Gold or Silver Star Clean Energy Policies:</b> AL, AR, GA, IN, KS, MI, MO, MS, ND, NE, OK, SC, SD, TN, WV, WY					

as a clean energy leader in recent years by putting energy efficiency at the top of the list for satisfying the state's future electricity needs, adding global warming emission standards to the Clean Cars Program, and adopting an aggressive renewable electricity standard.

California is also an example of the benefits that accrue to a state from clean energy policies. As of 2003, the state used less electricity per capita than any other U.S. state.<sup>72</sup>

**Connecticut** – Connecticut earns its gold star for action in a variety of areas. The state is among several northeastern states that have adopted the Clean Cars Program, its annual investment in energy efficiency consistently puts it among the national leaders in that category, and the state has adopted efficiency standards for 17 products. Recent reforms in the state's electricity system should ensure that the state is even more effective in tapping its energy efficiency resources in the years to come.

**New Jersey** – New Jersey has pursued a variety of innovative programs to promote clean energy. The state's adoption of the Clean Cars Program in 2004 was the first in a recent wave of state adoptions of the program. New Jersey's renewable electricity standard is among the most ambitious in the nation and includes a "carve-out" for solar energy that will make the state a national leader in solar energy development. The state is currently in the midst of developing an energy master plan whose goals include a 20 percent reduction in projected energy use by 2020 and the use of renewable energy to meet 20 percent of the state's electricity needs.<sup>73</sup>

**Oregon** – Oregon is one of only three states (along with California and Washington) to have gold star policies in each of the five areas discussed in this report. The state's new renewable electricity standard, adopted in 2007, will require

25 percent of the state's electricity to come from renewable sources by 2025. The state's significant investment in energy efficiency in the electric sector is bolstered by its investment in energy efficiency on the natural gas side. The state's RES also encouraged further investments in cost-effective energy efficiency by electric utilities.

**Rhode Island** – Rhode Island may be the smallest state in America, but it has positioned itself as a clean energy leader. Rhode Island's energy efficiency standards for appliances cover more products than any state other than California, and recent electricity system reforms should result in the Ocean State tapping more of its ample energy efficiency potential.

**Washington** – Like its neighboring state of Oregon, Washington has also demonstrated leadership in all five categories of clean energy policy discussed here. Washington is one of two states, along with Colorado, in which renewable electricity standards have been enacted by popular referendum. That same referendum, which occurred in 2006, also required utilities to pursue all cost-effective energy efficiency opportunities.

**New York** – New York is a special addition to the list of gold star states. While New York's renewable electricity standard technically does not meet the standard for a gold star policy, the standard's ambitious short-term goals for renewable energy development should create ample possibilities for further ramp-ups in renewable energy development in the years ahead. Moreover, New York, along with Massachusetts and Vermont, was an early adopter of the California Clean Cars Program. Finally, New York is currently the site of one of the most significant energy efficiency rulemakings in the country, as the New York Department of Public

Service develops rules to implement Gov. Elliot Spitzer's pledge to reduce electricity consumption in the state by 15 percent by 2015.

## Silver Star States

Five states achieved silver star recognition. They are:

**Massachusetts** – Massachusetts was an early adopter of the Clean Cars Program and is among the nation's leaders in energy efficiency investments.

**Maryland** – Maryland became the first state outside of California to adopt the recent wave of appliance efficiency standards and has recently updated its renewable energy standard to require increasing use of solar power.

**Maine** – Maine has long had the nation's strongest renewable electricity standard on paper, requiring 30 percent of the state's electricity to come from renewable energy. However, its RES had, until recently, done nothing to encourage new sources of renewable energy since the state already relies heavily on hydroelectric and biomass power. In 2007, though, Maine updated its RES to require 10 percent of the state's electricity to come from new renewable sources by 2017. The state also invests significant resources in energy efficiency.

**Pennsylvania** – Pennsylvania's adoption of the Clean Cars Program, coupled with efforts toward renewable energy and energy efficiency, are moving the state toward a cleaner energy portfolio.

**Vermont** – Vermont is home to one of the nation's most innovative and successful energy efficiency programs, Efficiency Vermont. The state was also an early adopter of the Clean Cars Program.

## Rising Star States

Nine states are recognized here as "rising stars" for recent actions to promote clean energy. Those states are:

**Arizona** – Arizona's revised renewable electricity standard, finalized in late 2006, will require 15 percent of the state's electricity to come from renewable resources by 2025. Significantly, the Arizona RES includes an aggressive carve-out for distributed renewable energy technologies like solar power, enabling the state to take advantage of its sunny climate for energy production. Arizona, along with neighboring New Mexico, is also poised to adopt the Clean Cars Program.

**Colorado** – Colorado began its ascent to clean energy leadership with the enactment of the state's original RES by popular referendum in 2004. Less than three years later, in 2007, the state doubled its renewable energy commitment, and is now committed to generating 20 percent of its electricity for investor-owned utilities from renewable resources by 2020. Colorado has also entered into a settlement agreement with Xcel Energy, the state's largest utility, which will require Xcel to meet aggressive energy efficiency targets. The state is now working to establish energy savings goals for all Colorado utilities.

**Delaware** – The summer of 2007 saw Delaware take a major leap forward in the development of clean energy. The state enacted an aggressive RES that calls for 20 percent of the state's electricity to come from renewable resources by 2020. Delaware also enacted legislation creating an innovative "sustainable energy utility" tasked with encouraging investment in energy efficiency in homes, businesses and transportation.

**Illinois** – Illinois is moving to take advantage of its vast wind energy resources. In 2007, Illinois adopted a renewable electricity standard that calls for the state to receive 25 percent of its electricity from renewable resources by 2025, with 75 percent of that power coming from wind. The same legislation

also requires steady increases in energy savings through energy efficiency improvements.

**Minnesota** – Minnesota is another state that adopted an aggressive renewable electricity standard in 2007, requiring Xcel Energy to use 30 percent renewable power in 2020 and the remainder of the state’s utilities to achieve 25 percent renewable energy by 2025. Minnesota also recently enacted an energy efficiency resource standard requiring energy efficiency savings of 1 percent of sales annually. The state also makes significant investment in electric and natural gas efficiency programs.

**Nevada** – With aggressive goals for renewable energy (particularly solar power) and energy efficiency, Nevada is working to make sure that clean energy supplies more of the state’s rapidly growing electricity needs. The state’s first-in-the-nation efficiency standards for light bulbs, enacted in 2007, will also generate significant energy savings in the years ahead.

**New Hampshire** – New Hampshire is a “rising star” by virtue of its adoption in 2007 of an RES that will require at least 16 percent new renewable energy by 2025. The state also makes significant investments in energy efficiency through its systems benefit charge.

**New Mexico** – In 2007, New Mexico adopted a 20 percent renewable electricity standard to be fulfilled by 2020. That followed on the heels of 2005 legislation requiring the creation of systems benefit charge-supported energy efficiency programs. The Clean Cars Program is also pending final adoption in New Mexico.

**Wisconsin** – Wisconsin updated and expanded its renewable electricity

standard in 2006 and in 2007 required utilities to bump up their spending on systems benefit charge-supported energy efficiency programs. The state’s investment in natural gas efficiency programs is among the highest in the nation.

## Zero Star States

While clean energy innovations are occurring in every corner of the United States, some states have done little to take advantage of their clean energy potential. Sixteen states have adopted no gold or silver star policies in any of the five areas addressed in this report. Those states are Alabama, Arkansas, Georgia, Indiana, Kansas, Michigan, Missouri, Mississippi, North Dakota, Nebraska, Oklahoma, South Carolina, South Dakota, Tennessee, West Virginia and Wyoming. In some of these states, modest efforts to promote energy efficiency and renewable energy are underway, but those efforts lag significantly behind those in most of the rest of the country.

The failure of these states to adopt clean energy policies is injurious not only to their residents and their states’ economies, but to the United States as a whole. Wasting energy – whether it is in the form of electricity, natural gas, or oil – sustains our dependence on polluting and dangerous sources of energy. Moreover, higher-than-necessary emissions of global warming pollutants threaten the future of both the United States and the entire planet.

America’s clean energy leaders have shown that clean energy policies work, and that those policies are consistent with a vigorous and growing economy. All 50 states, as well as the federal government, should follow their lead.

# Conclusions and Recommendations

America's clean energy leaders are paving the way toward a New Energy Future for America that is less reliant on fossil fuels and less costly to our environment and our economy. But America's energy challenges are deep and they are profound. Even "gold star" states have a long way to go to tap their full clean energy potential. And the federal government, whose energy policies have often taken America in the wrong direction, can take important steps to move America toward a New Energy Future.

## For Gold Star States

Just because a state has adopted cutting-edge clean energy policies does not mean that its job is done. Indeed, America will continue to look to those states for leadership in addressing the nation's energy challenges.

Gold star states should:

**Achieve the goals they have set**, by monitoring compliance with their current clean energy policies. States must ensure that the goals set in renewable electricity standards are met, that they enforce all aspects of the Clean Cars Program, and that building energy codes are aggressively enforced at the local level.

**Continue to innovate**, by adopting new appliance efficiency standards and state-of-the-art building energy codes as they are developed.

**Branch out** their clean energy strategies by developing new solutions to thorny problems, such as reducing the growth in vehicle travel on America's roads and limiting carbon dioxide emissions from power plants and other sources.

**Make the necessary investments** of time, energy and money to maximize their clean energy potential.

## For Silver Star and Rising Star States

Silver star and rising star states are beginning to experience the benefits of clean energy policies. Those states should:

**Adopt clean energy policies that they have not yet adopted**, thereby achieving a comprehensive and balanced clean energy effort.

**Provide leadership to neighboring states.** While the gold star states identified in this report are primarily in the Northeast and on the West Coast, silver star and rising star states are in nearly every region of the country. These states should monitor and track the benefits of their clean energy policies and share that information with neighboring states to encourage them to follow along.

**Go the extra mile** by strengthening energy efficiency programs and standards, increasing renewable energy goals, and adopting the Clean Cars Program.

## For Other States

**Consider the benefits of clean energy policies for your state.** Energy efficiency is frequently the cheapest, cleanest way to satisfy new energy needs, and that is just as true in the Southeast and Plains states as it is elsewhere. Decision-makers should ensure that energy efficiency and renewable energy are considered on a level playing field along with other measures to address energy needs.

**Adopt the five policies described in this report.** States across the country are proving that energy efficiency programs, renewable electricity standards and other clean energy policies are good for the environment and the economy. Other states should look at the examples of the clean energy leaders highlighted in this report and follow their lead.

## For the Federal Government

The federal government has long lagged in the development and implementation of smart clean energy policies. There is an important federal role to play in each of the five areas discussed in this report. The federal government should:

- Increase federal fuel economy standards to 40 miles per gallon by 2018, achieving energy savings and global warming pollution reductions surpassing those of the Clean Cars Program.
- Adopt a federal renewable electricity standard that requires 25 percent of the nation's electricity to come from renewable sources by 2025.
- Expand and extend federal tax credits for energy efficient vehicles, buildings and appliances.
- Adopt new federal appliance efficiency standards and improve the process for adopting standards to maximize cost-effective energy savings.
- Encourage and support the development of stronger residential and commercial building energy codes.
- Increase federal investment in clean energy research and development.

In addition, the federal government should allow and support state energy policy innovation wherever possible and adopt other policies to improve the energy efficiency of America's economy and spur the development and deployment of clean, renewable sources of energy.

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