Powering Up America

The Revolution Began Yesterday

Powering Up America

The Revolution Began Yesterday

By Cater Communications for the
Emily Hall Tremaine Foundation

Powering Up America
The Revolution Began Yesterday

1 **Foreword: Powering Up America**

4 **Executive Summary**

8 **Introduction: The View from Outside Washington, D.C.**

8 Powering Up Paradise

12 **A Panorama of New Energy Productivity**

14 **A Quiet Revolution—Spurred by State Leaders**

16 Energy Productivity: The No-Regrets, Commonsense Path to Powering Up

16 Making Utilities Smarter

16 States Teaming up to Power Up

17 Saving Taxpayer Dollars

18 Energy Efficiency: Lucrative Low-hanging Fruit

19 Spurring Private Industry

20 **Conservatives Leading the Race for Renewables**

22 The Market-driven Revolution

24 **The Conservative Case for Clean Energy**

25 **Tales From Three States: Red, Purple, and Blue – United on Clean, Efficient Energy**

27 South Carolina

30 Cutting Watts & Fighting Poverty with Home Energy Savings

33 Local Heroism with Federal Support: A Small Town Chooses Solar

36 Using Military Might to Power Up: High-Efficiency Toddler Care for the U.S. Marines

38 A Simple Equation in Greenville Schools: Using Less Energy Means More Teachers Have Jobs

41 Pennsylvania

43 Crayola's "Forest Green" Initiative: Energy Efficiency Savings Help Fund Clean Power

46 Energy Upgrades Rejuvenate a County Home for Seniors

48 An Energy-Saving Paradise: Opportunities Abound When You Build from Scratch

50 Connecticut

53 Expert Advice & Skillful Leadership Bring Big Savings from Small Changes in Milford Schools

55 Community Action Cuts Energy at Home

57 **Three Agents of Change: Technology, Military & Schools**

58 High-Tech Driving Both Energy Consumption and Savings

60 Powering Up the Pentagon

65 New Fuels for Schools

68 **It's Not All Bad News inside the Beltway**

71 What's Next?

73 Seeking New Savings: How We Achieve a Low-Waste, High-Performance Economy

76 **End Notes**

Powering Up America

The Revolution Began Yesterday

By Stewart Hudson
President of the Emily Hall Tremaine Foundation

One of the most underreported stories in America is that the transition to a new energy economy is real, it's here, and it's working – including in towns and cities you might not expect.

Powering Up America tells this story by going beyond the Beltway, beyond numbers and data, to introduce us to real people making real progress in Powering Up America's new energy economy.

Using case studies from three states that are distinct in terms of politics and energy – South Carolina, Pennsylvania, and Connecticut – the report documents how economic concern and enlightened self-interest are driving this movement – a trend that transcends politics by involving businesses, schools, and state and local governments. Providing further evidence that this shift is being driven by pragmatic concerns – including national security – Powering Up America also describes how (and why) the U.S. military has enlisted in this critical undertaking.

For more than a decade, the Emily Hall Tremaine Foundation has played a critical role in promoting and supporting the growth of state and local clean energy initiatives. We've done this working with conservative and not so conservative governors and state legislators. Among other endeavors, we have provided funding and expertise to create state action plans, and we have helped pioneer collaborations to develop and implement these plans.

Our mainstream approach recognizes the need to build the new energy economy from the ground up. Success is achieved by engaging the private sector, community organizations, and state and local governments, and by ensuring that we engage in red, blue and purple states, as well as in states with divergent energy profiles.

Unfortunately, little of what has already been accomplished in Powering Up this new economy makes it into the daily news cycle. All too often, national media look to Congress for evidence of America's shift to smarter and more productive energy systems. Not surprisingly, they find little to report besides continued inaction. Looking for signs of life in the wrong place distorts the national reality. Providing a more coherent sense of that reality produces a clear conclusion: that the clean energy economy is real, it's here, and it's working – including in places you wouldn't expect.

To fill this reporting gap, the Tremaine Foundation contracted with Cater Communications, a bipartisan communications firm with an expertise in clean energy. Cater's report digs deeply into what's happening at a local level in the three states where the Tremaine Foundation has been most active – South Carolina, Pennsylvania, and Connecticut.

Readers will note that the paper focuses on clean energy, primarily energy efficiency and conservation and to a lesser degree renewable energy, and does not address the dramatic rise in natural gas as a fuel for power generation, transportation and, in the Northeast, as a source of home heating. Largely because the natural-gas story has been so well documented, we kept our focus on the much less publicized yet, we believe, more historic movement toward enhanced energy productivity from efficiency and renewables.

To be sure, the world will need a lot more of an energy revolution than we've documented here to ensure a stable climate and cleaner air and water. Yet we believe the progress represents the beginning of a movement that will grow quickly, and be hard, if not impossible, to stop. For motivations that are only increasing – from economics to national security concerns –Powering Up the clean energy economy is real, and is working, and by now should be sending a message to Washington, D.C., that there is room for agreement on the economic as well as environmental benefits of this transition. We have an opportunity to borrow good ideas from Republicans and Democrats that will help bring this new energy economy to scale.

Our sincere hope is that this report is just a first step in documenting so momentous a change. With the report's website, **PoweringUpAmerica.com,** and interactive eMagazine (available for free download here), Cater Communications has designed the report in a way that invites the reader to become a part of this important and on-going effort. We here at Tremaine profoundly hope you will accept that invitation, and keep building and Powering Up America's new energy economy.

Finally, it's important that we acknowledge the extraordinary work that lead authors Katherine Ellison and BreAnda Northcutt, Morrow Cater, head of Cater Communications, and team members Roxanna Smith, Sarah Golden, Carina Daniels, Danielle English, and Cristen Farley have brought to this project. No one could have told this story better than they.

Executive Summary

Powering Up America: The Revolution Began Yesterday

There's a revolution underway. It's not on the news and politicians aren't talking about it. In fact, the mainstream media has probably given you the exact opposite impression. But right now, and all over America, a new economy is emerging – one built on a foundation of cleaner fuels and increased energy productivity.

Our opportunity: **Powering Up**. This report defines a new, multi-faceted energy transformation taking place throughout America. The phrase, Powering Up, encompasses the way Americans, in ever larger numbers, are:

- Making energy more productive – for any purpose, at any level ---– by consuming less energy per service or product.
- Asserting more control over energy by owning the means to generate it ourselves, opting for on-site, private, cleaner and more reliable energy sources.

- Demanding newer, high tech, cleaner domestic energy sources that protect our economy from volatile world markets, spare our air, water, and health, and decrease America's dependence on hostile suppliers.

Americans are discovering a new relationship with energy as we come to own our own generating systems. And the more we understand our energy use, the more control we want.

With sponsorship and guidance from the Emily Hall Tremaine Foundation, Cater Communications, a bipartisan firm, spent four months reporting on energy developments throughout the country. We interviewed mayors and mothers, engineers and policymakers, students, teachers, and military leaders, with special attention to three states with sharply diverse political and energy profiles: South Carolina, Pennsylvania, and Connecticut.

In these three states and throughout the country, we found one common causal thread in America's shifting energy habits: the economy. In the wake of the Great Recession, businesses, schools, policy-makers, families, and everyone in between have been looking for new ways to save money on energy costs. We are, in short, getting smart about our energy money. And, as a result, we American consumers are spending less on energy, and putting more of that money back into local economies.

Our key findings, elaborated in the following pages, are that:

- Beyond the Beltway, a quiet but pervasive and powerful transformation has been taking place in U.S. energy productivity – the amount of output per energy consumed – and the adoption of new, cleaner, and often privately owned energy sources. (pg. 14-17)

- Contrary to the stereotypes perpetuated by opinion media, this movement enjoys bipartisan support. In many cases, conservatives are leading the way. (pg. 20, 24)

- Despite partisan and often paralyzing debates on energy inside the Beltway, state and local governments have moved forward to champion energy efficiency and renewable power, with a wave of new businesses, policies and practices driven by public demand at the grass roots. (pg. 16, 22,25)

- The combination of energy efficiency and what has been a rapid growth of on-site generation of renewable energy is delivering greater economic security and independence from volatile fuel prices and an increasingly unreliable national grid (see state case studies pgs. 33, 36).

There are many drivers of this change. Our research identifies three that are helping Americans reduce waste, save money, and grow their local economies:

- Technology. Innovative, high-tech breakthroughs facilitating efficiency and renewable energy sources promise major reductions in dependence on fossil fuels in the near future. (pg. 58)

- Military. The nation's single largest energy consumer has moved quickly to adopt renewable energy sources, while improving its energy productivity by 13.3 percent over a 2003 baseline. Top military and intelligence experts, including a group of the nation's highest-ranking retired officers belonging to CNA's Military Advisory Board, identify our nation's oil dependence, climate change, and an outdated electrical grid as threats to our national security.[1] (pg. 60)

- Schools. All told, the nation's 133,000 K-12 schools annually spend $7.5 billion on energy.[2] Thousands of schools are pioneering new methods for reducing utility bills and freeing up funding for education. (pg. 65)

"It starts now with young America waking up and realizing that we have to do something. Have a revolution, like the computer age. Let's just run wild with it."

Jonothan Brunson, National Youth Director for the Christian Coalition

We Americans have made remarkable gains in energy productivity. Yet we've only begun to take advantage of the opportunities to save and grow. We're still paying more than we should for our electricity, primarily because of how much energy we waste. Research shows the U.S. now uses only about 14 percent of all energy we consume. In other words, America wastes a shocking 86 percent of our energy. This energy is lost mostly through escaped heat as electricity is generated, transmitted, and distributed,[3] representing a huge drag on our economy. [4] (Learn more on pg. 75)

Experts predict that a determined policy of efficiency investments could lead to the creation of almost two million new jobs, while saving consumers the equivalent of $2,600 per household per year.[5]

Powering Up America, which includes exclusive interviews with conservative leaders in and outside of Congress, is divided into four parts:

A Quiet Revolution – Spurred by State Leaders (pg. 14) looks at the drivers behind the new energy economy. Where national politicians have fallen short, state officials have stepped up and are leading the charge to develop a more efficient and profitable energy economy. Throughout the nation, policy and market forces together are driving the new economy – often with political conservatives at the forefront.

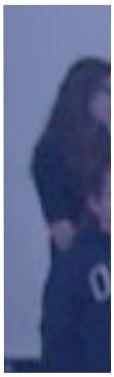
Next, we look at the economy from the ground. Tales from Three States: Red, Purple and Blue tells the stories of nine projects and policies in three states: South Carolina (pg. 27), Pennsylvania (pg. 41), and Connecticut (pg. 40), which have collectively cut energy use while saving consumers millions of dollars, providing relief during a time of tightened budgets. These stories illuminate the diversity of approaches to and benefits from Powering Up.

> I tell my colleagues to not let the hair on the back of your neck bristle, anytime someone mentions green energy. If you can figure out how to make a better, cleaner product, why not pursue it? And if you can make it out of a renewable source, isn't that better than one that can be depleted ?
>
> ***Rep. Cory Gardner, R-Colo.***

Thirdly, our research highlights three American catalysts that are helping to drive our shift to a cleaner, more efficient economy. Three Agents of Change (pg. 57) examines how and why technology, the military, and schools are sparking innovation and adoption of clean, efficient energy.

Finally, It's Not All Bad News Inside the Beltway (pg. 68) examines some bright spots at the federal level. Here, we look at bipartisan federal progress that is advancing the new energy economy and new ways to increase energy productivity.

Together, these perspectives tell the story of our nation's fast-moving transformation, revealing that – quite often – partisanship has very little to do with it.



INTRODUCTION: The View from Outside Washington, DC

Powering Up Paradise

The bright new gymnasium of the Paradise Elementary School filled with the sound of high-pitched voices, as students chanted: "Sing it; shout it; say it out loud: We are Paradise proud!"

Looking on were seven Republican and Democrat state legislators, who'd come from six surrounding states to hear more about the reasons for the local enthusiasm. The school, which serves 400 students from hard-working families in this conservative, southern Pennsylvania farming community, has earned honors for its smart, energy-saving design. With innovations such as geothermal energy, a white roof, and cutting-edge lighting systems, Paradise Elementary has reduced utility costs by more than $83,000 per year, compared to the average bills of similarly sized buildings. The improvements have freed up funds for new equipment and staff, and even helped avoid hikes in property taxes.

"This is the right thing for the environment and the right thing for the economy," Republican state Senator Mike Brubaker told the visitors.

The nation's opinion media often frames clean energy policies as caught in a partisan divide. Outside the Beltway, however, and largely ignored by politicized and mainstream media alike, Americans know that energy efficiency really isn't about politics - it's about common sense. It's about saving money that is needed for mortgages, our children's education, or putting food on the table. It's about growing a clean economy despite Washington's indecision and gridlock. It's about letting the free market do what it does best – make American industries more dynamic and strong. Cater Communications, a bipartisan firm, with sponsorship and guidance from the Emily Hall Tremaine Foundation, spent four months exploring America's energy habits. We looked at energy leadership throughout the nation, and focused our research on three states – South Carolina, Pennsylvania, and Connecticut. We focused on these three states because the Tremaine Foundation is active in each and because they are a study in contrasts, both in their political profiles and their strategies for energy generation and use.

The differences between these states make it all the more striking that each has made noteworthy recent efforts in adopting cleaner, more efficient, often privately owned energy sources. Throughout the nation, state and local governments, business leaders, religious groups, and non-profits have been following suit: reducing waste, using energy more efficiently, and tapping into renewable, on-site sources. We've dubbed this shift in energy habits Powering Up, and the benefits are clear. Grassroots efforts have saved consumers millions of dollars on power bills – money that can then be spent on local goods and services, generating jobs, and boosting the broader economy – while making families and businesses more resilient in the face of volatile energy prices.

Powering Up is defined as making energy more productive, asserting more control over energy, and demanding newer, high tech, cleaner domestic energy sources.

> Voters … are yearning for vision … and really want to look at something where America can lead and America can make progress.
>
> ***Lori Weigel, Republican Pollster***

We found stories of everyday Americans taking the reins after the federal government had fallen short, painting a robust picture of American ingenuity that illuminates how evolving practices can future-proof our energy economy. Outside the Beltway, it seems, Powering Up is apolitical.

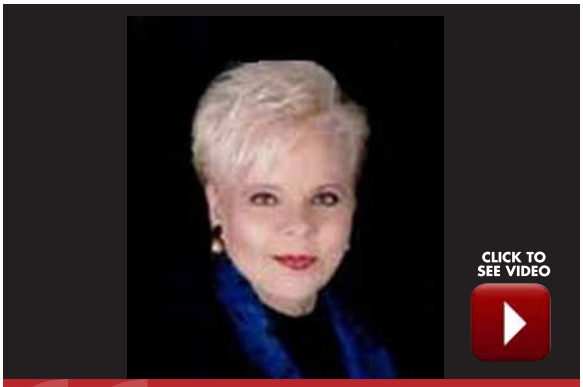
In a mobile home in the South Carolina ex-urbs, Powering Up means that a manicurist whose home-heating bills were costing nearly half of her salary is now cutting those bills in half, thanks to an innovative local program providing modern retrofits she'll pay for with her monthly savings, at no risk and with no money down.

At a Marine Corps recruiting depot on the Carolina coast, it means there's now a new child care center where toddlers crawl on floors warmed by on-site geothermal power, in hallways full of natural light, in a cutting-edge building that produces nearly all of its own electricity.

At the Crayola crayon factory in Easton, Pa., strategic attention to energy use has cut waste to the tune of $250,000 a year, while the company's nearby solar farm produces enough annual, on-site energy to make one billion crayons.

At an elementary school in Milford, Conn., a self-described Reagan Republican former maintenance supervisor takes pride in helping to save his district $800,000 over two years by using power more wisely.

Boosting energy productivity – the amount of economic output per energy consumed – both with efficiency and clean power, "makes sense as a free-marketer and as a capitalist," says Colorado Rep. Cory Gardner, a Republican, and leader of a new energy efficiency caucus on Capitol Hill. "Clean energy provides a lot of economic opportunity."



> This is not a Republican or a Democrat issue, this is a family values issue.
>
> ***Roberta Combs, President & CEO, Christian Coalition of America***

And the opportunities are plentiful. Despite all our recent progress, America wastes a startling 86 percent of the energy[6] we consume, which equates to billions of dollars annually that could be bolstering our economy in the wake of the Great Recession.

Opinion polls show that from Tea Party Republicans to left-wing liberals, Americans believe in a future of clean, efficient energy.[7] A major survey of consumer attitudes in 2012 found that 83 percent of consumers took steps to reduce their electric bills over the past year. Sixty-five percent of them went on to say they plan to use about the same amount of energy in the future.[8]

> When you get outside the Beltway, people truly care about clean energy. They truly care about cleaner water … a cleaner environment for their families. So there is a large disconnect, and that's what we have to show the legislators inside the Beltway.
>
> ***Michele Combs, President, Young Conservatives for Energy Reform***

This shifting attitude makes sense (who wants to pay higher bills?) and makes a difference. Our energy productivity has been increasing for the past 40 years. If we hadn't made that progress, we'd need to consume roughly 55 percent more energy, with all the financial cost and pollution that would entail, to maintain today's high-tech standard of living.[9]

But there is still much more we could do. Benjamin Franklin's famous axiom, "A penny saved is a penny earned" is still true today, albeit subject to inflationary pressures. So too, Powering Up represents billions of dollars in potential earnings at a much needed time. As the economy crawls toward recovery, these energy savings can rev the engine and spur American ingenuity, innovation, and economic growth.

A Panorama of New Energy Productivity

Throughout America, the movement toward a clean energy economy is ever more evident:

- The United States has been reducing energy waste on average by 2 percent a year – double what conventional economists predicted just a decade ago. [10]
- Oil imports have dropped to a 20-year low.[11]
- Efficiency programs offered by utilities saved customers a total of 18 million MWh from 2010 to 2011, a 40 percent increase from 2009.[12] That's close to the amount of electricity Wyoming uses in a year.
- In record and growing numbers, Americans are opting for privately owned, on-site power with the goal of switching to a power source that is cleaner and provides us with more control over their our energy bills. In 2012, more than 16 million solar panels were installed on U.S. homes and business – two panels for every second of the working day.[13]

- The U.S. military, the world's single largest energy consumer and, today, a surprisingly effective leader of the Powering Up trend, has been cutting back on energy waste at twice the rate of the national economy, while rapidly adopting renewable energy such as solar and geothermal power.[14]

- At this writing, 6,848 U.S. school buildings, representing a total of more than 685 million square feet, have qualified for the Energy Star label, certifying energy performance in the top 25th percentile of comparable buildings.[15]

- The stadium homes of the Atlanta Braves, Cincinnati Reds, Kansas City Royals, and St. Louis Cardinals, among dozens of other major sports facilities, now have major energy-efficiency projects underway, while 38 professional North American teams have adopted renewable energy.[16]

- Religious congregations have also been Powering Up, with 39 U.S. worship centers having met the tough Energy Star standard and thousands of others cutting watts and costs with energy efficiency measures.[17]

- Energy efficiency efforts at 149 U.S. medical facilities, which have earned special recognition for their energy leadership, reaped $14.3 million in savings in 2011.[18]

- The hitherto explosive growth in energy use – and waste – by data centers has slowed down well ahead of projections, due in part to new, cost-saving technologies. Global data center electricity use doubled from 2000-2005, but slowed to 56 percent growth globally and 36 percent growth in the United States from 2005-2010.[19]

A Quiet Revolution—Spurred by State Leaders

There are some logical reasons for the disconnect between the U.S. Congress and state governments when it comes to Powering Up. Most obviously, there's basic economics: state governments have been in charge of energy utilities throughout their century-long history. The states, not the feds, have day-to-day control over the $374 billion industry that sells Americans their power. That's the main reason why state leaders most directly feel the impacts of energy developments in their jurisdictions, whether or not they are directly responsible. In 2006, for instance, Maryland Gov. Robert Ehrlich, a Republican, lost his bid for reelection after more than one million Maryland electricity customers endured a steep rise in rates.[20]

> Look around at where the doers are …That's America… America is out where people do things. That's us; we're doers.
>
> *Former U.S. Secretary of State George Shultz*

Many state leaders are aware that, as pollster Lori Weigel points out, clean energy is popular among grassroots Republicans and Democrats alike. Everyone wants clean air and water. Most of us don't enjoy the thought of importing precious resources from unfriendly nations or rival states. Still, when all is said and done, people vote with their pocketbooks.

That's why so many state leaders have been first-movers to increase energy productivity by reducing waste and cutting ratepayers' bills. This has the twofold effect of hedging against volatile prices and creating homegrown jobs through energy efficiency projects.

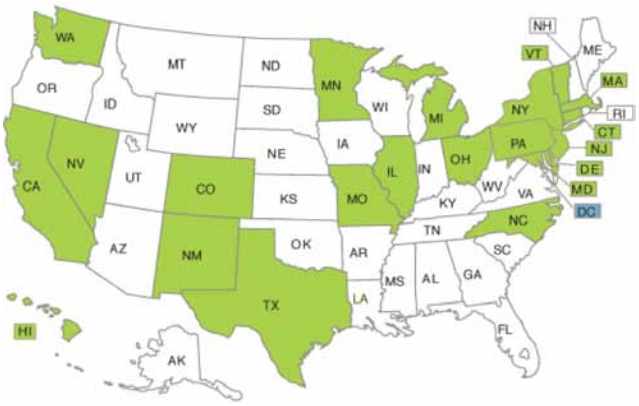
Quite likely another reason why state leaders have moved so far ahead of the U.S. Congress when it comes to Powering Up is that, historically, fossil fuel lobbying efforts have been less aggressive at the state level.[21] In 2012, oil and gas industry interests spent more than $139 million to lobby Congress,[22] continuing an expensive tradition that has lasted for decades. In contrast, it was only in 2012 that news reports disclosed that states had come under serious pressure by fossil fuel interests seeking to reverse their clean energy laws.[23]

At this writing, however, and particularly compared to the paralysis inside the Beltway, progress by the states has been formidable – most of all when it comes to the quintessentially all-American value of saving money by eliminating waste.

Energy Productivity: The No-Regrets, Commonsense Path to Powering Up

Imaginative initiatives to reduce wasteful watts have been spreading from state to state for the past three decades, and picking up pace over the past few years. The main motives are twofold – to save money (a keen motive during the past recession) and to reduce pollution that threatens public health.

Making Utilities Smarter



One powerful and increasingly prevalent tool that meets both objectives is a statewide efficiency standard, requiring power utilities to meet annual targets for cutting waste, thereby increasing energy productivity.

As of September 2012, twenty-four U.S. states[24] had policies that set mandatory targets that utilities must meet through customer energy-efficiency programs.[25] This process holds utilities accountable for getting customers the best rates, while reducing harmful pollution. The strongest of these policies are in Massachusetts and Vermont, which require nearly 2.5 percent of savings every year.

States Teaming up to Power Up

New England's six states have been particularly aggressive – and successful – in motivating utility companies to help customers save on energy and bills. As of December 2012, the states had made enough progress to delay plans to build a

quarter-billion dollars' worth of upgrades to electric transmission towers and lines. They pulled off this feat with more than 125 different state programs designed to fund and implement efficiency[26] – for example, by offering incentives for the purchase of home insulation and Energy Star appliances.

Many of these efforts come as part of an unprecedented nine-state collaboration launched in 2009, and known as the Regional Greenhouse Gas Initiative (RGGI). The pact joins the six northeastern states plus New York, Delaware, and Maryland, in America's first "cap-and-trade" program for carbon dioxide emissions, focused exclusively on the electricity sector.

While the principle aim of the pact is to reduce greenhouse gases, RGGI has had a major impact on energy productivity in all of its states.

Here's how this has happened: Under the pact, the utilities have had to pay for allowances for each ton of carbon dioxide they emit. Between 2009 and early 2013, power plant owners have spent roughly $912 million to buy these allowances from the states.[27] About half of that money has been spent on popular energy-efficiency programs in most of the states, contributing to the more than $1.3 billion in projected savings for utility customers and creation of 16,000 jobs created region wide.[28] Furthermore, this money stays local. As of this writing, RGGI has reduced payments to out-of-region fossil fuel providers by more than $765 million.

Saving Taxpayer Dollars

Whatever you think of cap and trade mechanisms, in the case of RGGI the program has had clear economic benefits – including pumping money into the nine states' economies without raising taxes. But increasing energy efficiency and productivity isn't solely the purview of the RGGI states. Conservative states throughout the country have made impressive energy-productivity progress by targeting energy waste at government agencies. In May 2012, for instance, Oklahoma's Republican Governor Mary Fallin signed a bill requiring state agencies and entities to use 20 percent less energy by 2020, with projected savings of half a billion dollars over the next ten years.[29]

In North Carolina, a decade-long "lead-by-example" campaign has cut energy consumption in state public buildings by 18 percent, and saved more than $417 million on water and energy bills. In 2011-12 alone, North Carolina public agencies saved close to $200 million in electricity costs. The University of North Carolina campuses have gone farthest, cutting utility bills by 61 percent.[30]

Energy Efficiency: Lucrative Low-hanging Fruit

Buildings are a fat and relatively easy target for savings from efficiency measures. They are estimated to use about one-third of the energy in the national economy. The U.S. government requires federal buildings to comply with efficiency standards, but there are no U.S. standards for the private sector. Once again, states have moved ahead. As of this writing, 40 states and the District of Columbia have adopted standards for energy efficiency in both residential and commercial buildings. Eleven of these 40 states have opted for the most stringent rules approved by the U.S. Department of Energy for residential buildings, while 19 of the 40 have done so for commercial properties.[31]

> What you hear in Washington is not what voters are saying …What voters are telling us is clear and consistent …They consistently tell us that they want to have a future where there is more clean, renewable energy sources in it. And they want to be more energy-independent, they want to have clean air.
>
> ***Lori Weigel, Republican Pollster***

Before 2009, only Washington, D.C., could boast of residential building standards meeting international standards; today 23 states can make that claim.

By several calculations, there are huge savings to be had from improving building energy efficiency. In 2012, Deutsche Bank and the Rockefeller Institute reported that the United States could save $1 trillion over the next ten years with an investment of $279 billion on energy retrofits in U.S. residential, commercial, and industrial buildings.[32] The California Clean Energy Fund (CalCEF) estimates that some four million mid-sized U.S. buildings could save as much as $150 billion over ten years through a $105 billion investment in energy efficiency upgrades.[33]

Spurring Private Industry

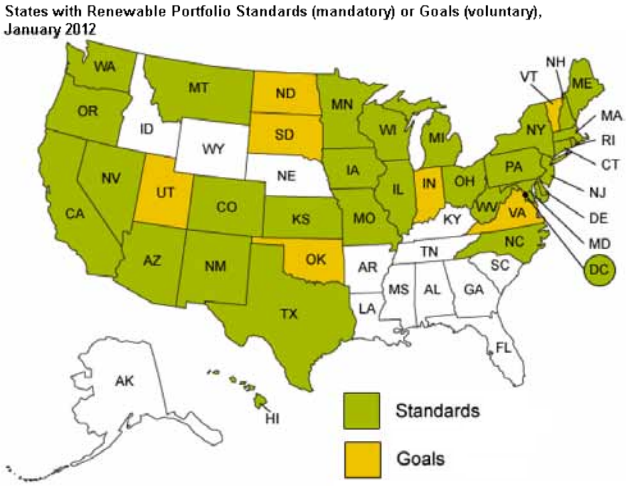
As all of these state governments have provided clearer signals to their economies with these thrifty new rules, private industry has responded. One striking trend has been the growing strength of a new industry – known as energy services companies, or ESCOs – born during the 1970s oil shocks and energy price increases.

The ESCOs develop, install, and help finance projects designed to improve energy efficiency in buildings. Such projects can include anything from high-efficiency lighting to combined heat and power systems and centralized energy-management programs. What sets the ESCO contractors apart is that they assume the risk that a given project will save the amount of energy they guarantee. Their services, and usually also the cost of their improvements, are repaid over time, with the payments tied to the promised energy savings.

ESCOs have been great job-creators. Over the past three decades, they've installed $20 billion worth of projects, with more than one-third of that amount going directly to local labor.[34] ESCOs are a perfect example of the private sector seizing opportunities created through government rules. In other words, the state laws have created structure for the new energy economy to thrive, pushed by market innovations.

Conservatives Leading the Race for Renewables

Beyond cutting waste, a majority of U.S. states have been encouraging their electric utilities to adopt cleaner, renewable power through standards that set a minimum requirement for the share of electricity supplied by renewable sources by a certain date. And as history shows, conservatives have led the way.



Wind-rich Iowa was the first state to pass such legislation, signed into law by Republican Governor Terry Branstad back in 1983. As other states followed, they adopted rules that vary dramatically between one locale and another. Some states are much more aggressive than others, while some also set goals for specific types of energy that align with state resources. Many state standards have "escape clauses" that trigger if the costs of renewable generation rise higher than a specified threshold.

Today, 30 states plus the District of Columbia have enforceable Renewable Portfolio Standards (RPS), and seven additional states have similar but voluntary goals.[35] The standards have sharply increased renewable power generation throughout the country, with the bright-red state of Texas being one of the most interesting examples.

Then-Gov. George W. Bush supported his state's new standard in 1999, creating a mandate that Texas power generators collectively generate 2,000 megawatts (MW) of additional renewable energy by 2009. This goal was met by 2005, after which current Gov. Rick Perry supported and signed legislation to set new goals of 5,880 MW by 2015 and 10,000 MW in 2025.[36] As of October 2012, Texas had already met the second of these goals, with 10,929

megawatts online, making it the first state to hit the benchmark of 10,000 MW of wind energy.[37] Under this program and others, Texas has become the largest wind-power generating state in the nation.[38]

Defying Beltway stereotypes of conservative opposition to renewable power, George W. Bush and Rick Perry have a surprising amount of company within their party – at least on the state level.

> I want Kansas to be known not only as the Wheat state—but as the Renewable state.
>
> *Gov. Sam Brownback, R-Kan.*

Several Republican governors have been outspoken champions of America's wind industry. The fledgling sector employs 85,000 Americans throughout the country,[39] compared to 87,520 in centuries-old coal-mining sector.[40] Iowa Gov. Terry Branstad is a leader of this group, for many good reasons. Iowa's early investments in wind have paid off with more than 200 state wind firms now generating more than $50 million annual revenue, employing more than 6,000-7,000 people,[41] and supplying one-fifth of the state's electricity.[42]

Nurturing wind power has also been a priority of the past three governors of Kansas – particularly Gov. Brownback – due to the state's abundant wind and open landscapes. Kansas was among the top five U.S. states in wind energy investment in 2012, while wind energy development in Kansas has produced more than 12,000 jobs and pushed down power rates for consumers – achievements that have led Brownback to say, "In addition to wheat and cattle, I want Kansas to be known as the Renewable State."[43] The majority of Kansas' state lawmakers apparently agree; they recently voted down an attempt to delay the state's renewable-energy targets for utilities.[44, 45]

> I am thrilled to see our great State at the forefront of this promising industry, and I look forward to Arizona further establishing itself as our nation's Solar Capital.
>
> *Gov. Jan Brewer, R- Ariz.*

That decision is understandable, considering the benefits Kansas has reaped from the policy. Kansas landowners have been receiving more than $13 million annually from wind turbine land rents, while wind developers contribute more than $10 million dollars a year to Kansas communities.[46]

In Arizona, Republican Gov. Jan Brewer is a solar-power champion who vigorously supports renewable energy tax credits, championing an industry that has brought new investments and jobs to her growing state. "I am thrilled to see our great state at the forefront of this promising industry, and I look forward to Arizona further establishing itself as our nation's Solar Capital," Brewer said in September of 2012.[47] Brewer faces competition, however, from Nevada's Republican Gov. Brian Sandoval, who in a state address in 2011 said, "I support all efforts to make Nevada the renewable energy capital of the country."[48]

In New Jersey, a more recent solar power center, with more than 10,000 projects installed throughout the state, Republican Gov. Chris Christie has pledged that his administration would be "unrivaled in our aggressive support for the development of renewable sources of energy," which he calls not only an environmental boon but also "an engine for economic growth and the creation of good-paying jobs for the people of our state."[49]

"The future for New Jersey is in green energy," Christie has declared, "and already we've put in place policies to broaden our access to renewable sources of energy, cleaner natural gas generation and ending our reliance on coal generation."[50]

The Market-driven Revolution

> The future for New Jersey is in green energy and already we've put in place policies to broaden our access to renewable sources of energy, cleaner natural gas generation and ending our reliance on coal generation.
>
> *Gov. Chris Christie, R-N.J.*

Powerful market forces have pushed the shift in U.S. energy use over the past four years, a period that *The Wall Street Journal* recently characterized as "one of the fastest energy transitions in U.S. history."[51] In that time, the use of coal has fallen from nearly half to barely one-third of U.S. net electric generation, while, as mentioned earlier, U.S. oil imports have fallen to a 20-year low.

The economic downturn helped contribute to this change. Even more did the discovery of huge new domestic supplies of natural gas. Yet other factors that can't be ignored have included spectacularly rapid technological advances – and dramatic cost reductions – in renewable energy

technologies, including solar, wind, and geothermal systems. The price of both solar and wind power have dropped precipitously; the average price of a solar panel has fallen by 80 percent in the past five years, and is on track to continue to plunge.[52] The price of wind has dropped by fifty percent in the last eight years and is now cheaper than coal produced by new plants subject to relatively strict regulation.[53]

Recently, Georgia Power Co., the Atlanta-based unit of The Southern Company, bought 250 MW of wind energy – enough to power 50,000 homes. "We are continuously evaluating energy options that provide the best overall economic value to our customers," said Georgia Power President and CEO Paul Bowers."[54]

> I support all efforts to make Nevada the renewable energy capital of the country.
>
> *Gov. Brian Sandoval, R-Nev.*

Indeed, for all the excitement about natural gas, wind power was the number-one source of new U.S. electricity generation in 2012, accounting for more than 40 percent of new capacity.[55] Wind, solar, geothermal, and other renewable sources, not counting large hydropower, made up 49 percent of the nation's new power capacity last year.[56] In other signs of change, the U.S. wind industry in August 2012 for the first time surpassed 50,000 megawatts (MW) of generation capacity – enough to power 13 million homes. At the same time, domestic solar installations more than doubled in the second quarter of 2012 compared to 2011, with enough installed solar to power one million homes.[57, 58]

These historic trends are evident throughout America.

THE CONSERVATIVE CASE FOR CLEAN ENERGY

There are powerful reasons for the emerging consensus that pursuing efficient, clean energy is in our nation's best interest:

- Increasing energy productivity is CHEAP: Saving energy by eliminating waste costs zero to $50 per Megawatt hour, on average, compared to $62 to $141 for coal and $48 to $95 for wind power, when using carefully calculated estimates that account for mostly hidden subsidies affecting conventional generation technologies. (A typical family home uses about 10 Megawatt hours of electricity per year.)[59, 60]

- Efficiency investments PAY OFF: Each dollar invested in efficiency programs results in $2 in savings for business and residential utility customers.[61] What's more, during the recent economic downturn, houses meeting the Energy Star efficiency standard – roughly 30 percent more efficient than average homes – were 32 percent less likely to go into default.[62]

- Energy efficiency GROWS THE ECONOMY: Consumer spending is the number one driver of economic growth in our country. By far the biggest impact in terms of new jobs comes when consumers save money on energy bills that they can then spend on other goods and services, boosting the general economy.

- Powering Up with clean, efficient energy PROTECTS HEALTH, SAVING LIVES AND HEALTH CARE DOLLARS: Particle pollution from coal power plants causes an estimated 13,200 premature deaths every year, as well as 9,700 hospitalizations and 20,000 heart attacks in the United States.[63] From 2005 to 2007, Californians alone paid out $193,100,184 for hospital care related to illnesses caused by air quality that fell short of federal clean air standards.[64] Pollution costs the United States billions of dollars of lost economic productivity every year. Asthma alone (a condition known to be exacerbated by air pollutants)[65] costs the United States more than $50 billion annually in medical costs, lost school and work days, and premature deaths.[66] In contrast, increasing efficiency and renewables curbs emissions, maintaining the purity of our air and water.

- Energy efficiency HELPS AMERICAN FAMILIES: More than 789,000 homes were weatherized between 2009 and 2012, saving an estimated $7 billion for hard-working Americans struggling to pay high utility bills.[67]

- Smart energy strategies make power MORE RELIABLE: On-site energy, from solar panels and wind turbines to combined heat-and-power systems, not only improves efficiency but reduces dependence on a centralized grid that is vulnerable to extreme weather events and other disruptions. In recent years, aging infrastructure and inadequate new investment have combined to make the grid increasingly unreliable, with longer and more serious power outages.

- Minimizing waste while increasing clean energy ENHANCES OUR NATIONAL SECURITY: Reducing our dependence on a volatile world oil market and unfriendly producers makes America stronger.

Tales From Three States: Red, Purple, and Blue – United on Clean, Efficient Energy

For a closer look at the diverse ways that everyday Americans are taking up the clean energy challenge, consider the following nine case studies from South Carolina, Pennsylvania, and Connecticut.

A caveat here: One thing you will note as you read through these stories is that several of the projects described have benefitted from federal funding, mostly as part of the $90 billion made available from the American Recovery and Reinvestment Act of 2009 stimulus program to accelerate the clean energy economy. Given the pervasiveness of those grants, it is not surprising that many local projects have been directly or indirectly touched by these funds in some way. Indeed, the stimulus funds will likely affect the clean energy economy for years to come. It's worth noting, however, that barring only the special case of the Marine Corps recruiting center, each of the projects we've selected, whether or not they received federal support, were both designed and initiated locally – in most cases by politically conservative local officials and businesses.

Each of the following stories illustrates a different approach to Powering Up. Each also represents a different set of circumstances, advantages, and challenges. Yet all of them highlight our fundamental finding: that the clean energy revolution is well underway, and making progress in some unexpected places.

In the 2012 American Council for an Energy Efficient Economy State Scorecard, South Carolina was listed among the three "most improved" states of the union. Pennsylvania had made "significant progress." And Connecticut ranked sixth best among all 50 states. Our stories from these states offer portraits of people from dramatically different backgrounds, income levels, and political beliefs – all of whom are pursuing a new and cleaner energy future.

South Carolina

In 2010, Sen. Lindsey Graham told reporters, "The green economy is coming. We can either follow or lead. And those countries who follow will pay a price. Those nations who lead in creating the new green economy for the world will make money."[68]

Graham's clean energy enthusiasm has been echoed by the state's governor, Nikki Haley, elected in 2010 with Tea Party support. Haley, who briefly worked at a recycling company before she turned to politics, earned kudos from the Southeast Energy Efficiency Alliance in April of 2012 for signing legislation to update state energy codes – a key reason for her state's "most improved" ratings from the ACEEE. The new law requires that all buildings constructed after January 2013 comply with the relatively strict 2009 International Energy Conservation code. There's also a new requirement to reduce energy use in state buildings and public schools by 20 percent from 2000 levels by July 2020. All new or substantially renovated state buildings must meet LEED Silver standards.[69]

South Carolina has substantially fewer greenhouse gas emissions than much of the rest of the nation, due largely to its four nuclear plants (two more are to be completed in 2017 and 2018),[70] which supplied just more than half of the net electricity generation in 2011.

> The green economy is coming. We can either follow or lead. And those countries who follow will pay a price. Those nations who lead in creating the new green economy for the world will make money.
>
> *Sen. Lindsey Graham, R-S.C.*

The state's embrace of clean energy has its limits, however. South Carolina remains among the minority of U.S. states without a renewable- portfolio standard that would require power companies to expand generation from clean energy sources, although a law that would create one was introduced but not adopted in the 2011-2012 South Carolina Senate.[71] At last count, renewable energy resources accounted for barely four percent of the state's total energy mix, with almost half of that total coming from conventional hydroelectric power.[72]

Still, South Carolina has ample opportunity – and incentives – to Power Up in coming years. The state has enough offshore wind resources to meet twice its electricity needs. A Clemson University report in October 2012 estimated that construction of a single 1,000-MW offshore wind-farm could create more than 3,800 jobs a year for ten years, generating nearly $2 billion in wages.[73]

Meanwhile, increased efficiency measures could tap into a similarly vast resource – energy waste.

Georgia Institute of Technology public policy professor Marilyn Brown has called the southern United States a "Saudi Arabia of energy efficiency" – the implication being that what the region squanders today could become the fuel of tomorrow.[74]

Energy historically has been cheaper in the South, providing one less incentive to save. Although the region's residents make up 36 percent of the nation's population, they consume 44 percent of our nation's energy.[75] Efficiency programs well underway in much of the rest of the country are still just catching on here, and southern states, including South Carolina, spend less per capita on such

programs than the national average. The South Carolina Clean Energy Business Alliance estimates that more than 21,000 jobs could be created in the state by 2025 by developing more energy and water efficiency programs.[76] Those 21,000 jobs would theoretically be enough to put more than 11 percent of South Carolina's unemployed back into the workforce.[77]

> In the process of becoming energy independent, we're going to create thousands if not millions of jobs here at home.
>
> *Sen. Lindsey Graham, R-S.C.*

In 2010, South Carolina's legislature took a big step toward solving its energy waste problem when it approved an innovative measure allowing electric cooperatives to offer "on-bill financing" – a way to pay for energy efficiency improvements with little or no money down. Twenty U.S. states now have versions of this program, which lets customers pay for energy efficiency improvements with the money saved on electricity bills.[78] One of the largest is in Kansas, where hundreds of homes have been weatherized.

THE PROJECT

On-bill financing for home energy upgrades

THE PLACE:
Aiken, S.C.

THE SAVINGS:
$1,240 per house per year

WHAT MADE IT NECESSARY:
High power bills exacerbating poverty

WHAT MADE IT POSSIBLE:
A new state law allowing on-bill financing, and an early loan from the U.S. Department of Agriculture

Cutting Watts & Fighting Poverty with Home Energy Savings

MIKE COUICK
CEO of Electric Cooperatives of South Carolina
HELPED LAUNCH "HELP MY HOUSE," AN ON-BILL LOAN TO WEATHERIZE HOMES.

Sheila Winburn earns less than $16,000 a year as a manicurist in the central South Carolina town of Aiken. In recent years, during the coldest months of winter, she has paid up to $650 a month to heat her small, drafty mobile home.

Winburn has coped by economizing on food, by leaning on relatives, and, for the past several years, by going without health insurance. But in the fall of 2012, she got a break. A new program, managed by her local electricity co-op, offered to cut Winburn's bills in half by making her home more energy efficient. The best part? Winburn didn't have to pay a dime. All costs to retrofit her home will be paid with future energy savings. "I was really excited when I heard about this," Winburn says. "It's going to change everything."

About 17 percent of South Carolina's residents live in poverty – one of the highest rates in America.[79] Many of them, like Winburn, are trapped by out-of-control energy bills that demand up to fifty percent of their income, forcing them into cruel daily choices: heat or medicine, air-conditioning or food.

Mike Couick, CEO of the Electric Cooperatives of South Carolina, the state's largest electric distribution system, understood that homeowners like Winburn could never have afforded to pay

upfront costs for all the work needed to reduce energy costs. So in the spring of 2011, his consumer-owned organization, which includes 18 electric cooperatives and two wholesale power-supply cooperatives, launched a pilot project called "Help My House," weatherizing 125 homes with on-bill loans.[80]

Sheila Winburn has slashed her energy bill through efficiency.

The homes involved were mostly lower-cost, mobile, and manufactured houses built long before America began to get serious about saving energy. Contractors have sealed leaks, added insulation, and replaced aging and inefficient heating strips. For an average cost of $7,262, the project has reaped about 35 percent energy savings per home, shaving bills by an average of $1,240 per year. In most cases, the improvements will pay for themselves in less than six years, and provide savings for up to 30 years.

Homeowners like Winburn get immediate relief with reduced power bills, even as a fraction of their energy savings goes to pay for the improvements providing those reductions. With little threat of default – Couick says there has been just one to date –the loans have also proven to be a good investment for the co-ops involved in the pilot program, helping many members pay their bills on time.

What made the pilot project possible was a recent change in state law that allowed on-bill financing, supported in part by a $740,000 loan from the U.S. Department of Agriculture. The pilot was so successful that in July of 2012, Secretary of Agriculture Tom Vilsack extended similar financing to other projects throughout the country.

"This saves money for the homeowner, but also for everyone else," Mike Couick says. By increasing their members' homes' energy efficiency, he explains, the co-ops can reduce peak demands on the grid, when utilities charge their highest rates. More indirect benefits may include fewer foreclosures and less need for safety-net spending by governments and charities attending to homeowners who can't pay their power bills.

"My dad is a conservative Republican, but he supports this program," says Pauline Medford, the energy contractor who helped retrofit Winburn's home. Medford's dad is a fan not only because of how the project promises to save the state money, but because it has been good for Medford's business. As a co-owner of Carolina Energy Savers, she now has eight fulltime employees – three of whom were hired in 2012.

Couick expects many more jobs to be created if the co-op program expands. “If we do this at scale, we’ll have 7,000 new jobs in South Carolina alone,” he says.

The South Carolina co-op, whose 1.5 million members make it the state’s largest energy distribution company, depends on coal for 84 percent of its power, so more efficiency means less air pollution and greenhouse gas emissions.

South Carolina’s on-bill financing program’s standout success has caught national lawmakers’ attention. The Rural Energy Savings Program Act (H.R. 4785),modeled on the co-op organization’s pilot, passed in the House of Representatives with broad bipartisan support in 2010, although it ultimately died in the Senate.[81]

THE PROJECT

Energy efficiency improvements in a town's community center and meeting hall. The community center also got a new solar roof.

THE PLACE:
Woodford, S.C.

THE SAVINGS:
$150/month

WHAT MADE IT NECESSARY:
Preventing a hike in property taxes

WHAT MADE IT POSSIBLE:
Local ingenuity and a federal grant

Local Heroism with Federal Support: A Small Town Chooses Solar

Charles Stoudemire, the mayor of Woodford, S.C., (pop. 183) voted for Newt Gingrich in the 2012 Republican primary. He favors a smaller federal government and opposed President Obama's economic recovery program. Yet when Stoudemire learned that federal stimulus funds were available for energy improvements, he was quick to apply. "I'm a Republican, but I'm also a realist," he says.

In 2009, the mayor received a federal Energy Efficiency and Conservation Block Grant of $80,000 to make upgrades to Woodford's community center and an old firehouse that has been converted to a meeting hall and exercise room for elderly residents. Half of that money, plus a small county government grant, paid for energy-efficiency upgrades to both buildings. Workers added insulation, lowered the fire-station ceiling to trap more heat, and replaced an aging air conditioner and heater. With the rest of the money, Stoudemire installed 36 solar panels on the community center roof.

The changes brought Woodford $150 a month in savings – which may not sound like much, yet constitute 23 percent of the town's total electricity bill. Stoudemire says the savings guarantee he won't have to raise property taxes. He's also pleased to have a cleaner, more reliable on-site energy source.

The federal stimulus program that paid for Woodford's block grant authorized a total of $90 billion for investments and tax incentives for similar, albeit mostly larger projects, to "lay the foundation for the clean energy economy" throughout the nation.

The federal plan required that all new energy infrastructure be produced and installed by U.S. citizens. Two South Carolina companies, based in Aiken and Greer, did the work on the Woodford project. The panels now provide so much power that the town gets a credit each month on its utility bill. Stoudemire used some of the savings to buy new, energy-efficient LED bulbs for the winter holiday decorations.

Woodford is a smattering of small farms and homes just off the Savannah Highway, twenty miles southeast of the state capital, Columbia. Before taking over as mayor, Stoudemire worked as a chemical operator at Eastman Kodak. In that job, he spent six months in Holland, where he acquired a new perspective on energy.

"It opened my eyes," he says. "What they did with wind power and conservation got me really interested in how we use energy. We're really wasteful."

His experience with solar power has made him a champion: "There are no moving parts; no maintenance we need to do; they just sit there and soak up the energy," he says.

Stoudemire was encouraged when the price of solar panels came down so much right after he applied for the grant that by the time he got the money, he could afford to buy 12 more panels than he had planned.

With such clear advantages, Stoudemire argues, clean energy shouldn't be a partisan issue.

"Collectively we can solve any problem because everyone, no matter what party, has good and bad ideas," he says.

Woodford is represented by Rep. Joe Wilson, a Republican. In past years, Wilson has voted against tax incentives for conservation and renewable energy.[82] Yet in 2012 he joined a new bipartisan energy efficiency caucus, co-led by his Republican colleague Rep. Cory Gardner.

While thrift was his main motive for making the energy upgrades, Stoudemire is also worried about the environment. His family has farmed corn for most of his life, giving him a close-up view of a changing climate.

"We used to plant in the middle of March to early April. Now we plant a month earlier," he says. "We're also seeing more drastic changes in rain; there are more heavy downpours and then it's over." As a father and grandfather, he worries about the state of the planet he'll leave behind. He's mystified, he adds, that many more mayors haven't followed his footsteps.

"They're focused on short-term problems," he says, "But we need to look down the road, not to the next election, but to the next 20 to 30 years. And we have to sit down and think about what we're doing because we're going in the wrong direction. We have to solve this energy problem."

THE PROJECT

"Net-Zero" Child Development Center

THE PLACE:
Parris Island Marine Training Depot, near Beaufort, S.C.

THE SAVINGS:
Monthly energy costs are less than $3

WHAT MADE IT NECESSARY:
An aging, increasingly unreliable national grid, and military leaders' increasing concerns about base security, national security, over-reliance on fossil fuels, and climate change

WHAT MADE IT POSSIBLE:
Executive Order 13514, signed in 2009, ordering federal buildings to achieve net zero status by 2030

Using Military Might to Power Up: High-Efficiency Toddler Care for the U.S. Marines

The offspring of U.S. Marine instructors at the training depot on Parris Island, near Beaufort, South Carolina, are getting a very early lesson in cutting-edge energy technologies.

While their parents bark commands to fresh trainees marching nearby, the toddlers crawl on floors warmed by geothermal power and nibble snacks in rooms lit up by solar panels.

The depot's new Child Development Center, which cares for more than 300 infants, toddlers and children, is a sprawling, 25,775-square-foot building that's a model of energy ingenuity. More than one thousand, maintenance-free rooftop solar panels posted on a nearby parking structure supply virtually all of its electricity and hot water. "It is the top-of-the-line child development center in the country," says Matt Higgins, project manager at Sauer Inc., the Jacksonville, Fla.-based company that built the $13 million center, which opened in the spring of 2011.

Sharon Brown, civilian director of the Child Development Center at Parris Island, helped design the facility. On a recent tour of the building she proudly extolled its advantages. "It's awesome to know we're saving money that can be put back in the program, to benefit the children," she said.

With a yearly energy bill of just $33, the Child Development Center qualifies as "net-zero," meaning it supplies nearly all of the energy it needs.

While the savings produced by the center's energy advances are compelling, the military's effort to increase energy efficiency, decrease dependence on fossil fuels, and increase onsite generation is driven by national security concerns. Among other benefits, onsite generation protects domestic bases from potential electrical outages that can be caused by either deliberate attack or an accident affecting the grid. (See section below on the U.S. military as an agent of Powering Up.)[83]

The Child Development Center isn't the only extraordinary energy-saving showcase at Parris Island, a 95-year-old base where some 20,000 new Marines are trained every year. Atop the 1st Battalion mess hall are solar panels, manufactured by Vanir Energy, based in Sacramento, Calif., which provide both air-conditioning and hot water. The unusual system is a demonstration project made possible by a grant written by the Southern Research Institute and installed by a local firm in September 2011.

Parris Island is in South Carolina's second district, which before the redistricting that went into effect in January of 2013 was represented by Rep. Joe Wilson. "The solar investments recently made at Parris Island serve as a great asset and represent the 'all of the above' energy approach I proudly support," says Wilson. "By having a diverse energy portfolio that our nation can produce domestically, we are making successful strides in becoming energy independent."[84]

THE PROJECT

Energy Management at the Greenville County School District

THE PLACE:
Greenville, S.C.

THE SAVINGS:
At least $4 million in net savings

WHAT MADE IT NECESSARY:
Maintaining teaching staff with high energy bills

WHAT MADE IT POSSIBLE:
A supportive school board, energy expertise, and a $1.9 million federal grant

A Simple Equation in Greenville Schools: Using Less Energy Means More Teachers Have Jobs

Ask Bill Knight, the director of energy management for the Greenville County School District in South Carolina, how his office has managed to save $4 million in operating costs, and he'll take you to a room in a large industrial building, where three men stare at computers all day.

"This is my nerve center," Knight says proudly.

The men and computers track energy use throughout the huge district, which, with its 100 schools, educates 73,000 students – ten percent of the state's total. "I can tell you at any time what the temperature is in any classroom," Knight says. And that's just for starters: Knight's watchmen also follow humidity levels, air flow, whether light switches and computer screens are turned on or off, whether rooms are occupied, and, of course, if anything needs fixing.

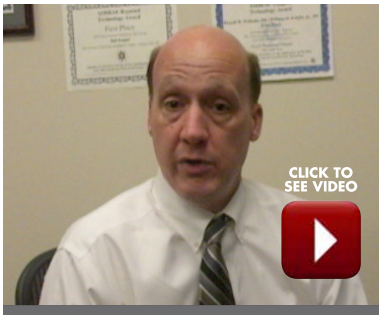
These are helpful strategies when you're dealing with utility costs currently running at $50,000 per day.

Knight, a mechanical engineer, has worked for the school district since 1995, but the last decade has been his most productive.

Beginning in 2002, the district went on a building binge, renovating, replacing and adding schools to accommodate population growth and deferred maintenance. During that time, Knight got something he'd long desired: a computerized building-management system.

It wasn't until 2009, however, that Knight got the go-ahead to make full use of the new system. Squeezed by the recession, the district had to make deep budget cuts. Knight finally got the chance to make good on his promises that he could save money with better energy management.

"It caused me some worry," he admits. "I'd been guaranteeing 30 percent returns." Once he got the go-ahead, Knight realized his job might be on the line.



BILL KNIGHT
Director of Energy Management, Greenville County School District, SC

But then Knight got some help, via a grant of $180,000 he could use for his energy conservation management program. It was part of a larger $1.9 million grant from federal stimulus funds, which paid mainly to upgrade lighting, heating and air conditioning units at several of the district's schools.

Knight used some of the money to hire two energy managers and moved forward with aggressive behavior modification. That meant, among other things, sweeping through classrooms to ban the many hundreds of personal space heaters, coffee pots, and mini-refrigerators long beloved by employees. Lights were turned off when not strictly needed and temperatures adjusted higher in the summer and lower in the winter.

Initially, says Knight, some of the employees complained, at which point he and his managers patiently explained that if they didn't cut energy, they'd have to cut payroll. He leans back in his chair, reciting what he told them from memory: "You can have all that stuff back and we can set all your temperatures back, but you're going to have to give me the names of two or three of your coworkers to sacrifice so you can have all these nice things."

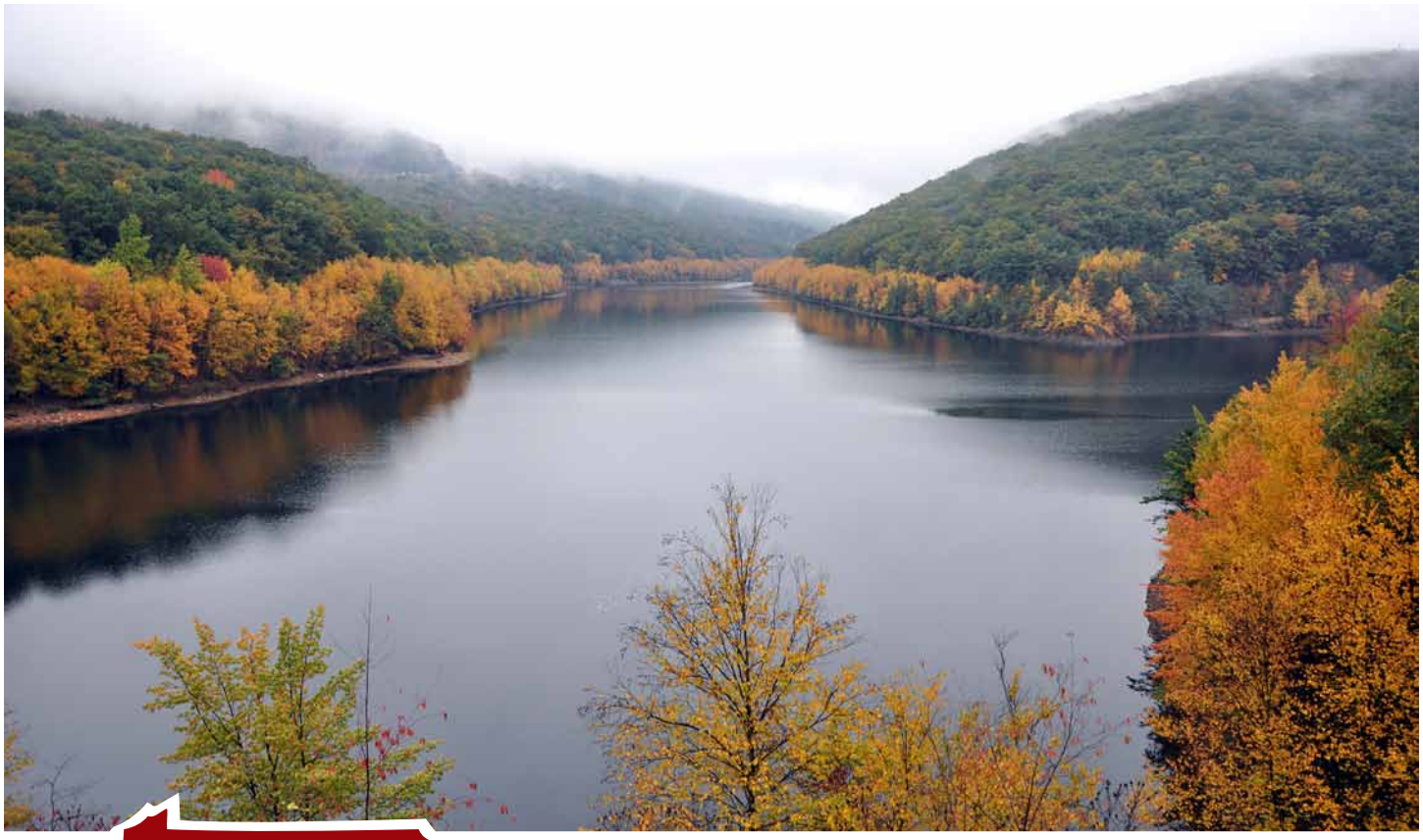
"When we explain it to them like that," he says, "we usually don't have any problems getting cooperation."

By Knight's calculation, Greenville schools have lowered their annual utility bill over the past three years from approximately $19 million down to $14 million. Twenty-two of the district's schools have received the Energy Star label, awarded to buildings that demonstrate energy efficiency

gains. (More than 6,300 K-12 buildings throughout the United States have received the Energy Star label at this writing.) And in November 2012, the South Carolina Energy Office, a state budget agency, gave the Greenville School District its Energy Project of the Year Award, in recognition of its progress.[85]

Greenville County is extraordinarily conservative. Until January, it fell within South Carolina's 4th congressional district, represented by Harold Watson "Trey" Gowdy III, a Tea Party member who has not been friendly to energy efficiency legislation.[86] Because of redistricting, however, the county's current representative is Republican Jeff Duncan, whose website touts his interest in renewable energy sources, including wind, solar, biomass, and geothermal.

Knight, who says he is "one of the most conservative guys you'll ever meet," says Greenville's energy improvements weren't motivated by environmental concerns. "This is not about global warming," he says. "This is a money issue for us. It's an economic survival issue."



Pennsylvania

In the heart of the Keystone State, places with names like Coaltown and Oil City remind visitors of the major role fossil fuels have played in building the state's economy. Today, Pennsylvania ranks second in the nation for energy generated from nuclear power, which provides about one-third of its net electricity. Until very recently, coal provided even more – about 44 percent in 2011.[87] Pennsylvania ranks fourth in the nation for coal production, which creates a big disincentive to promote clean energy. Even so, the more recently established clean energy economy enterprises today employ more than 180,000 Pennsylvanians,[88] according to the Pennsylvania Department of Labor and Industry. (At last count, Pennsylvania's coal industry employed 8,665 people.)[89]

Pennsylvania is considered "purple" – or a political swing state. While the last time a Republican carried Pennsylvania in a presidential election was 1988, it is the site of a ferocious and close political battle every general election. The state's current governor, Tom Corbett, is a Republican, who took over from Democrat Ed Rendell in 2011, a year in which Pennsylvania's energy future was transformed by the Marcellus Shale natural gas boom. Annual gross natural gas production more than doubled in the state during that year.[90]

Nonetheless, Pennsylvania has made striking progress in Powering Up – with a flurry of new bipartisan legislation enacted in 2008. The landmark achievement was Act 129, the Energy Savings Law, requiring all electric-distribution companies with 100,000 or more customers to reduce energy consumption and demand. In its first two years, Act 129 – authored by Republican state Rep. William Adolph – achieved $278 million in annual savings for electric ratepayers, for a single upfront investment of $281 million.[91]

Also in 2008, the state first began requiring its utilities to increase generation by renewable sources, mandating that 18 percent of electricity sold by 2021 must come from renewable or approved alternative sources, including at least 0.5 percent from solar photovoltaic power. Finally, the Alternative Energy Investment Act, also signed that year, provided $650 million in funding and tax credits to develop clean energy in the state.[92]

It hasn't all been clear sailing. In August of 2012, the Pennsylvania Public Utility Commission overrode critics' efforts to let Act 129 expire, instead extending it until May 2016, and later also voting against utility companies' efforts to reduce their required investments under the law. Gov. Corbett applauded the extension of the Act, saying, "The biggest energy resource we have is a wise consumer and a progressive industry."[93]

Pennsylvania ranked #20 among U.S. states in the 2012 ACEEE ratings, with Act 129 being a major reason the state was credited with having made "significant progress."

THE PROJECT

Energy efficiency improvements and a 34,200-panel solar farm at the Crayola Factory

THE PLACE:
Easton, Pa.

THE SAVINGS:
More than $250,000 annually from efficiency savings, with an undisclosed increase in energy costs for solar power

WHAT MADE IT NECESSARY:
Concerns about finances and air pollution, and building Crayola's reputation as a company that cares about its young customers' futures

WHAT MADE IT POSSIBLE:
Consolidation of source materials, new factory technology, and a $1.5 million federal grant

Crayola's "Forest Green" Initiative: Energy Efficiency Savings Help Fund Clean Power

Peter Ruggiero, executive vice president of global operations for Crayola, LLC, guides the driver of his van up a dirt road, past a cornfield. Straight ahead is a different sort of farm: 20 acres of row after row of gleaming solar panels. Those panels – 34,200 in all – provide 3 MW of power, more than one-fifth of the total used by the company's nearby corporate headquarters and manufacturing plant. "We make a billion crayons a year with the power of the sun," Ruggiero declares.

Ruggiero and Crayola take great pride in the firm's solar farm, featured in a centerpiece display at the company museum in downtown Easton, which attracts nearly 300,000 visitors a year. But the heart of what the company calls its Forest Green Initiative – and what really helped pay for all those panels – is a highly determined, if less photogenic, campaign for energy-efficiency.

Energy experts say it makes the most economic sense to improve efficiency as much as possible before considering renewable energy. Efficiency improvements cost much less on average, and most big businesses have a lot of low-hanging fruit. In 2008, for instance, Crayola managed to shave $150,000 off its annual energy bills, just by upgrading its factory and office lighting systems. That same year, factory managers also bought several electric-injection molding machines to replace the old hydraulic ones, reducing energy use by 15 percent, and ultimately saving more than $100,000 a year. More recently, the company consolidated a portion of its paraffin manufacturing supply used to make Crayola crayons, switching from Louisiana to Western Pennsylvania, which saved about 5,000 barrels of fuel per year.

To add the solar farm to its Forest Green plans, Crayola collaborated with two Pennsylvania firms: UGI Energy Services, an energy marketing firm, and PPL Renewable Energy. The companies provided capital and built the farm on a leased section of Crayola's land, selling the energy generated back to the company via a multi-year sales contract. The project created about 25 temporary jobs at PPL and three to four permanent positions at UGI, which expanded its solar development group.

The panels began producing power in August of 2010, in a ceremony featuring bipartisan political support.

"If this country is going to become more self-sufficient, we need to diversify our energy supply," said Rep. Charlie Dent (R-Pa.), who helped flip a symbolic giant switch. "On behalf of the House of Representatives, I wish you all the luck in the world."[94]

Crayola's solar project has had its share of luck – not least of it a $1.5 million federal grant in 2009 – yet has also prospered from determined planning, stretching back to 2005.

Ruggiero has a teenaged daughter named Katrina, which may help explain why he paid such close attention to the devastating hurricane that struck New Orleans that year. As a father, he worries that future climate change may lead to more deadly and damaging weather. Since as a manager, he also worries about budgets, he has become one of Crayola's strongest champions for clean, efficient energy.

Over the course of the project, the price of solar panels fell by more than four percent. At the same time, however, Pennsylvania's natural gas boom sharply lowered the cost of energy from the grid. So while Ruggiero had originally hoped to save money, he confirmed in the fall of 2012 that Crayola's solar power hadn't yet managed to compete with the rock-bottom price of natural gas.

Ruggiero says he still wouldn't have done anything differently. The huge savings achieved by the efficiency measures more than defray the cost of the solar power. Meanwhile, he notes that the solar panels have helped Crayola cut its greenhouse gas emissions by 3,800 tons a year, an effort he describes as "the right thing to do."

It certainly hasn't hurt the company's image. Crayola, founded in 1885 as an industrial pigment firm, specializing in shoe polish and printing inks, has been highlighting its energy improvements to present a more conscientious, modern image to the public. The company won the Governor's Award for Environmental Excellence in 2010 and the American Lung Association's Mission Award in 2011.

Crayola has also been setting an example – at least among its neighbors. Standing in the cornfield, Ruggiero proudly points to the gleaming solar panels on a trade school on the right and a middle school to his left. "When we started, no one else around here was doing this," he says.

THE PROJECT

Energy upgrades at the Kane-Ross home for the elderly

THE PLACE:
Ross Township, Pa.

THE SAVINGS:
Up to $12,000/ month

WHAT MADE IT NECESSARY:
Infrastructure on the verge of collapse

WHAT MADE IT POSSIBLE:
Guaranteed savings through innovative contracts – and a federal grant

Energy Upgrades Rejuvenate a County Home for Seniors

Philip LaMay remembers the cold winter morning in 2006 when a maintenance supervisor who had just come from the county jail handed him a rusty piece of broken pipe.

It was one of those classic moments of crisis that lead to opportunity. For LaMay, acting director of public works for Pennsylvania's Allegheny County, the sight of that pipe – a sign of the impending collapse of the jail's heating system – helped galvanize a cost-saving transformation of the county's energy infrastructure.

The jail wasn't the only problem. The county-run nursing home in Ross Township, a 186,000 square-foot building housing 220 elderly residents, was in particularly dire straits. Its boiler was failing, and the 20-year-old air-conditioning system was running at just one-third capacity. Workers had been spraying the system's coils with water from hoses to cool them down during the summer.

"It wasn't just that things were falling apart," LaMay recalls. "Our steam bill had jumped up 70 percent in a matter of months. That really rocked our world. It was obvious that we couldn't defer investment anymore, and we couldn't do it piecemeal."

Aware that the county couldn't afford substantial upfront investments, LaMay began to investigate a program under which energy service companies, or ESCOs, upgrade infrastructure for very little or no money down, guaranteeing energy savings and agreeing to be paid as those savings accrue. He was proceeding with that plan when he learned that Allegheny County would receive about $5 million in federal stimulus funds for energy projects – and so ended up taking advantage of both opportunities.

Energy service companies went to work in almost every county building. At the home for the elderly, they replaced boilers, put in new windows, installed a new efficient lighting system, and upgraded the heating and air conditioning systems. LaMay said the savings realized by these changes have more than satisfied expectations, running more than 15 percent ahead of projections. At the home for the elderly, he estimates that upfront investments of roughly $2 million have already led to savings of $12,000 per month. That has helped the county avoid tax hikes and layoffs, even during the worst years of the recession.

PHILIP LaMAY
Acting Director of Public Works
Allegheny County, PA

The Ross home upgrades have also helped create a powerful team spirit, which has led to even more energy savings. In October 2012, the home's staff won a county-wide challenge by cutting its average monthly electricity use by 8.6 percent and water by 15.4 percent, by simply paying attention to waste.

LaMay calls himself an Independent who didn't vote for President Obama in either election. Yet he sees the stimulus program's energy funds as "the best possible use of federal dollars."

"What we're really excited about is that this is a story of sustainable government," he says. "We're concerned about being good stewards, both of the environment and our county funds, and we've found a way to do that."

THE PROJECT

Paradise Elementary School

THE PLACE:
Paradise, Pa.

THE SAVINGS:
$83,000/year

WHAT MADE IT NECESSARY:
An aging school needed to be replaced

WHAT MADE IT POSSIBLE:
A Pennsylvania law granting 10 percent subsidies for the construction of new schools meeting high environmental standards

An Energy-Saving Paradise: Opportunities Abound When You Build from Scratch

John Bowden started work as the new business manager for the Pequea Valley school district in 2006 – a year of rising oil and gas prices due to soaring levels of demand and new tensions over Iran's nuclear program.

A few months earlier, the school board had voted to replace an 80-year-old elementary school in the farming town of Paradise.

The timing couldn't have been better for Bowden, an energy-efficiency buff, to make his case for some strategic investments. Still, he marvels at how quickly the board, made up mostly of conservative farmers, came to share his enthusiasm.

"Once we saw how much money we could save, the plans became like a snowball rolling downhill," he recalls. Some of the fuel-saving strategies, devised by Bowden and his like-minded architect, cost no extra money to incorporate into the original building design. A white roof reflected heat, cutting down on air-conditioning costs. The building was angled toward the sun to take advantage of natural light.

The harder decision for the board was to spend about $50,000 extra for geothermal energy, compared to a traditional boiler system. Bowden convinced the members to give it a try, with estimates that the wells could eventually pay for themselves.

At the time, Pennsylvania's state government offered a powerful incentive for schools to invest in new environmentally responsible construction: a promised reimbursement of 10

percent of the costs for buildings meeting the LEED silver standard. (The program has since been suspended due to budget cuts.) Paradise ended up getting the gold certification – an achievement that has proven abundantly cost-effective.

In January 2009, the 91,000 square-foot school opened its doors to nearly 400 elementary school students. Within three years, Bowden calculated that the energy-smart design was saving on average more than $83,000 per year. The geothermal wells made good on the architect's promise that they'd pay for themselves, turning a profit within just two years.

As school districts throughout the United States make similar investments – with many taking advantage of similar state incentives – recent media reports have singled out some of the new schools as not delivering on their promise.[95] Paradise School isn't one of them. Bowden says the school district has been able to defer raising property taxes, due to the savings from the Paradise project.

JOHN BOWDEN
Business Manager
for the Pequea Valley School District, PA

John Bowden, business manager for the Pequea Valley School District, saves over $80k a year in energy efficiency.

Among other benefits, he cites some 30 fewer sick days by staff members since the school opened, saying "people just feel better in this building."

At this writing, no research has conclusively proven that green schools, per se, are any healthier than the norm. Yet environmentally friendly upgrades usually involve better ventilation and temperature controls, which increase comfort levels. And research suggests that more ample use of natural light, another common feature, helps regulate sleeping patterns.

Bowden showed off his new school at a November 2012 meeting of state lawmakers convened by the Center for Green Schools, a two-year-old project of the U.S. Green Building Council. It was the third in a series of conventions dubbed "Common Ground on Green Schools," a hopeful reference to the notion that while Republicans and Democrats may not agree on reducing greenhouse gas emissions from new buildings, they reliably appreciate health benefits for kids and cost-savings through energy efficiency. Three of the seven state lawmakers attending the meeting hosted by local Republican state Sen. Mike Brubaker were Republicans. Indeed, several state legislatures and the U.S. Congress now have bipartisan green-school caucuses, while many Republican lawmakers have been outspoken in support of environmentally friendly schools.

Connecticut

With its college towns of New Haven, Middleton, and Hartford, and its suburban commuters to New York, Connecticut is widely considered one of the more liberal states in the Union. In reality, the state is a patchwork of liberal and conservative areas, which, together, have offered strong support for state leaders' bold clean energy agenda.

As Gov. Dannel Malloy, a Democrat, has explained his state's pragmatism: "It used to be that you could only be pro-business or pro-environment. You had to pick sides between business and labor. Let me say clearly that I reject those false choices. Energy is an issue that allows us to rise above these dividing lines and presents us with an opportunity to tackle some of the toughest challenges of our time."[96]

Over the past few years, with bipartisan support, state officials have sharply increased both energy efficiency and the diversity of the state's energy portfolio, creating new incentives for utilities and consumer-driven energy-saving programs.

COMMISSIONER DAN ESTY
Connecticut Department of Energy & Environmental Protection

COMMISSIONER DAN ESTY
Connecticut Department of Energy & Environmental Protection

In an interview with Cater Communications, Commissioner Dan Esty, head of the Connecticut Department of Energy & Environmental Protection (DEEP), said that energy efficiency has become Connecticut's number-one target – most of all because it makes economic sense. Connecticut has the nation's second-highest electricity rates, partly due to region-wide congestion of transmission lines.[97] As Esty explained, cutting energy consumption reduces the cost of doing business, which in turn improves competitiveness, profits, and job opportunities.

In the two years since the state created his office, Esty and his team have been implementing energy reforms at a pace that would make many a bureaucrat's head spin. In the process, Connecticut has emerged as a national leader in financing energy efficiency and clean energy projects, earning the number-six spot on the ACEEE's ranking of energy-efficient states.

> It used to be that you could only be pro-business or pro-environment. You had to pick sides between business and labor. Let me say clearly that I reject those false choices. Energy is an issue that allows us to rise above these dividing lines and presents us with an opportunity to tackle some of the toughest challenges of our time.
>
> ***Gov. Dannel Malloy, D-Conn.***

The state has one of the nation's most ambitious targets to increase generation of clean energy. It required that 16 percent of its power come from efficiency and renewable sources by 2012 – a share slated to increase to 27 percent by 2020. Additionally, to encourage the flow of capital to new energy ventures, Connecticut established the nation's first "green bank," the Clean Energy Finance and Investment Authority. The bank can borrow money from the private sector to fund all types of clean energy projects, including electric and natural gas vehicle infrastructure, electricity storage, renewable energy, and energy efficiency.

In 2012, Connecticut also adopted the first statewide commercial "property assessed clean energy program" (C-PACE), allowing property owners to obtain low-interest loans to finance energy-efficiency updates and renewable energy. And in February 2013, Connecticut issued its Comprehensive Energy Strategy, the first state effort to plan state energy use out to 2050.[98]

> Dozens of companies have come to Connecticut in the last year to set up shop and to build out their operations, because we've created these incentives for every citizen, every home, and every business to take on this energy efficiency agenda.
>
> ***Commissioner Dan Esty, Connecticut Department of Energy & Environmental Protection***

Esty said Connecticut's proactive energy policies have been paying off in new investments: "Dozens of companies have come to Connecticut in the last year to set up shop and to build out their operations," he told us, "because we've created these incentives for every citizen, every home, and every business to take on this energy efficiency agenda."

THE PROJECT

Energy efficiency at Milford Public Schools

THE PLACE:
Milford, Conn.

THE SAVINGS:
$800,000 net savings over two years

WHAT MADE IT NECESSARY:
Looming budget cuts due to the recession prompted the district to adopt and implement an energy savings plan

WHAT MADE IT POSSIBLE:
Professional consultants and determined leadership

Expert Advice & Skillful Leadership Bring Big Savings from Small Changes in Milford Schools

"That doesn't need to be on," says Jim Whitaker, energy director of Milford Public Schools, as he breezes through the Foran High School hallways.

In one quick movement, he opens the control panel of a wall-mounted heating unit and flips the switch. Supervising the school's automated heating and air conditioning system, monitoring the lighting, and checking on large appliances including vending machines are just a few of the items on his daily "to do" list. Whitaker visits several Milford Public School buildings each weekday and night as well as on the weekend.

An unlikely administrator, Whitaker led the maintenance workers union for more than a decade before starting his new position as the energy hawk for Milford's 14 schools and 6,800 students in 2010. The position was born out of necessity. In the wake of the 2008 recession, administrators in the picturesque town that sits on the Wepawaug River in Southwestern Connecticut looked at the budget and realized the district would have to cut costs or lose teachers.

The Milford Board of Education began the process of cutting energy waste in January 2011, adopting district-wide energy-saving guidelines. Whitaker admits he worried at first whether the policies would deliver, but says they cut net energy spending by $800,000 over two years.

"It is mind-boggling the money we've been saving," he says.

Simply shutting down all computers and monitors at night across the school's 14 buildings saves as much as $3,200 a month. Installing inexpensive timers on the vending machines, which turn the machines off overnight and on the weekends, saves $300 per machine per year

(adding up to close to $10,000 in savings per year). Replacing the refrigerators in teacher rooms with Energy Star-rated appliances saves about $240 in operating costs per year per unit.

The district also invested in new copiers that go to "sleep" when not in use. Classroom temperatures are kept at 68-72 degrees in order to cut costs. The district replaced exhaust fans (through attrition) with the most energy-efficient models, instead of the cheapest.

"I am a Ronald Reagan Republican and I am fundamentally cheap," says Whitaker. "So it makes it all that much more exciting for me to save taxpayer dollars and reinvest them in a better way."

JAMES WHITAKER
Energy Director, Milford Public Schools, SC

These days, teachers, students, and administrators are all working together to drive up the savings. Elementary students take pride in shutting off the lights during recess and lunchtime. And when someone forgets, there is always a friendly reminder from Mr. Whitaker.

"I go out when the buildings are closed and say, 'Okay, did everybody do what they were supposed to do?' If they didn't, I leave them a note," says Whitaker, who explains his salary and all other costs for the energy program are covered by the district's energy savings.

> I am a Ronald Reagan Republican and I am fundamentally cheap. So, it makes it all that much more exciting for me to save taxpayer dollars and reinvest them in a better way.
>
> ***Jim Whitaker, Energy Director Milford Public Schools***

"The whole idea is to take the money and put it back into the classroom," says Whitaker.

Milford's energy savings are also avoiding pollution from power plants – equivalent to taking 222 cars off the road or planting 31,584 trees. And the school district isn't stopping there: its next goal is to earn an Energy Star rating for each district building by the end of 2013.

Whitaker says constant vigilance is essential if Milford wants to continue to increase its energy savings. And Milford's teachers, students, and administrators seem to energetically support the district's efforts. As Whitaker made his rounds through the library, a teacher was heard to say, only half-teasingly: "Uh-oh, turn off the lights, Mr. Whitaker is here!"

THE PROJECT

"Neighbor-to-Neighbor Energy Challenge"

THE PLACE:
Westport, Conn.

THE SAVINGS:
$1.4 million

WHAT MADE IT NECESSARY:
Recessionary pressure and local concern about residential energy waste

WHAT MADE IT POSSIBLE:
Determined communities, an innovative program, and federal support

Community Action Cuts Energy at Home

Affluent Westport, Conn., sparkles with high-end shops and celebrated residents. Martha Stewart once called it home, as did Hollywood legend Paul Newman. Pristine streets lead from one beautifully appointed home to another. Yet for years, Westport has harbored a dirty secret: unusually wasteful energy use.

Town leaders first confronted this challenge in 2006, when they developed a Clean Energy Action Plan aimed at cutting energy waste and increasing renewable power. David Mann, chair of Westport's Green Task Force, says the task of improving building efficiency was a natural focus, since it was most within the town's ability to control.

Westport's picturesque homes tend to be large, old, and inefficient. So Mann and his colleagues devised what they called the Westport Home Energy Challenge, an effort aimed at getting residents to do home audits, apply for upgrades, and learn more about options for installing solar power.

The project, which was initially slow to take hold due to a lack of funding, took off when Westport joined a statewide pilot program called the Neighbor-to-Neighbor Home Energy Challenge, administered by the state's Clean Energy Fund. The effort began in October 2010, with a $4.17 million grant from the U.S. Department of Energy. At this writing, 14 Connecticut towns have participated, with Westport leading the pack.

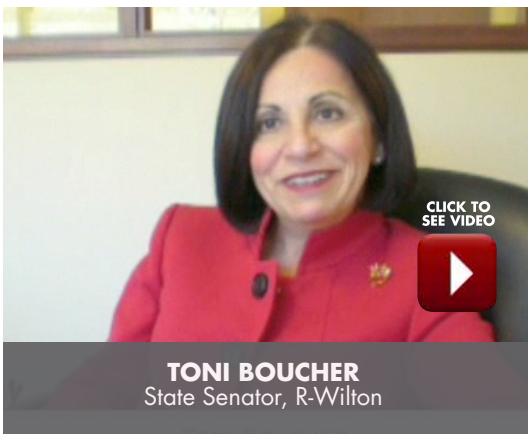
Under the program, different communities compete to become more efficient through home energy upgrades. Communities can earn rewards, such as free, solar-powered LED street lights. At this writing, 686 Westport households have received free energy assessments from the local utility, Connecticut Light and Power. Nearly 90 of those households have gone further, completing energy efficiency upgrades

including improving insulation and increasing the efficiency of their heating and cooling systems. Nearly 60 have also contracted to install solar panels. Cumulatively, Westport households have reduced their energy use by more than 3,500 MWh, saving $353,089 per year in energy costs.

Mann credits the effort's strong performance to outreach by religious congregations and other civic-minded groups, including the Westport Historical Society and the League of Women Voters, all of which helped contact residents who might otherwise not have thought to investigate their homes' energy use.

> Energy efficiency "is a very conservative approach. Everyone wants to save and conserve on our natural resources and our assets."
>
> *State Sen. Toni Boucher, R-Wilton*

By the end of 2012, throughout Connecticut, homeowners joining the Neighbor-to-Neighbor program had completed 2,814 energy efficiency assessments, 582 lighting upgrades, and 236 energy-upgrade measures. The efforts represent $1.4 million in savings.



Republican state Sen. Toni Boucher, who represents both Westport and nearby Wilton, where she lives, has completed her own home energy audit. She's particularly proud of Wilton's energy-saving progress – the town came in second in the statewide challenge, having shaved $145,777 from residential energy bills.

The town of Wilton, meanwhile, is actively working to cut municipal energy use. From 2010 to 2011, the town decreased energy use by 8.8 percent, avoiding $165,048 in energy costs.[99] Upgrades include modernized lighting systems at the local high school and library and a new "smart" heating and cooling system in Wilton's community center.

Wilton historically leans Republican, while Westport is considered Blue. Boucher says party affiliation shouldn't preclude anyone from seeking energy savings at home and at work. Energy efficiency, she maintains, "is a very conservative approach. Everyone wants to save and conserve on our natural resources and our assets."

Three Agents of Change: Technology, Military & Schools

Some of the most encouraging progress in America's move to Power Up can be seen in two of our nation's largest institutions – the armed forces and K-12 schools. Together, they involve more than 72 million people and several billion square feet of buildings – representing enormous opportunities to engage and educate Americans to be smarter about energy, and to incubate and scale-up new technologies. These catalysts, along with all the other agents of change propelling America's Powering Up, are enabled by technology that gives us new capacities and affordability in efficiency and renewable energy, while consumer electronics drive up use.

High-Tech Driving Both Energy Consumption and Savings

> If we can send someone to the moon, we can surely come up with a better energy reform than we have now. And I think if we can just work together within a positive manner, and just use our own resources here in this country, we can truly make a miracle in the energy field.
>
> ***Michele Combs, President, Young Conservatives for Energy Reform***

iPhones. iPads. Facebook, Twitter, and Nooks. Increasingly sophisticated espresso-makers. Hair ornaments that come with their own instructional DVDs. With all the new ways that have emerged in recent years for Americans to use electricity, it's easy to imagine our national energy consumption veering entirely out of control.

Yet even as the endless stream of new software and devices offer such watt-wasting temptations, innovations in high tech and information technology are creating enormous savings potential.

Americans are demanding new ways to control their energy use – and manufacturers are stepping up to the plate. From apps that provide long-distance command over home thermostats to newly sophisticated computerized building management systems (see the Greenville schools case study), high tech is helping consumers manage their energy and their bills better than ever before. Energy experts say that this is just the start: that in the very near future, the proliferation of "smart grids" will enable consumers to Power Up even more – by providing ever more opportunity for distributed energy and energy efficiency technologies.

In fact, recent research by McKinsey & Co. estimates that developments such as smart grids, energy-efficient lighting, home-control networks, ultra-efficient appliances, and distributed generation could reduce residential energy demand in new construction by as much as 85 percent by 2020.[100]

The rapidly advancing global battery industry will likely be a linchpin of progress in Powering Up. Innovators are finding new, cheaper, and more effective ways to store energy from renewable power. And more efficient batteries are translating to less energy use by all sorts of consumer electronics, from phones to cars.

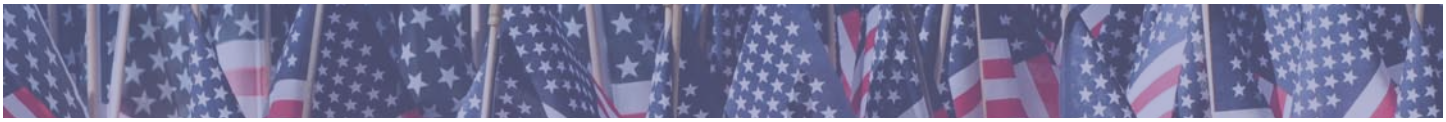
Entrepreneurs in the United States and elsewhere have meanwhile been working on a variety of other new ways to save energy.

A Florida insulation company called FiFoil, for instance, has been adapting an ingenious new, gas-filled building insulation that is more efficient, lighter, and more flexible than previous materials. Invented at the Lawrence Berkeley National Laboratory, the FiFoil gas-filled panels can already be found in the LEED Gold-rated New York Power Authority building.[101] The Berkeley Lab scientists have also created new "smart" windows, in which glass coated with materials such as zinc oxide lets more or less light into a building depending on the climate outside and the settings selected by an occupant or building manager. That in turn helps cut back on heating and cooling costs.[102]

Other big energy-saving advances have included an ingenious adhesive that can be sprayed into air ducts to seek out and plug leaks, and cheap, wireless stickers that can be placed on a device such as a pipe to measure energy flow and report it back to a central hub, providing instant diagnostics.[103]

And then there's the Bloom Box: an on-site generator and storage device, the size of a sedan, that can use a wide variety of energy inputs, including fossil fuels or solar power, and which eliminates the energy usually wasted on the way from the utility.[104] The solid oxide fuel cell, manufactured by Bloom Energy of Sunnyvale, Calif., has been adopted by corporations including Google, Walmart, Safeway, AT&T, and eBay. And the company reportedly is working on building a new, more affordable version of the box that could be used by homeowners.[105]

To be sure, these kinds of innovations and gains in energy productivity haven't occurred in a vacuum. As U.S. states have joined the move to Power Up, they've created powerful incentives for entrepreneurs and increasingly strong signals for industry. The global market in clean energy technologies has been estimated at $268 billion.[106] The wisdom of our state and federal lawmakers may determine whether the United States leads or follows in this new industrial revolution.



Powering Up the Pentagon

Taking maximum advantage of these and other technological breakthroughs, the U.S. military, traditionally the most conservative U.S. government arm, in recent years has made a stunning transformation – into one of the nation's leading advocates for cutting waste and Powering Up with clean energy.

It's certainly about time: The U.S. Department of Defense today remains one of the world's largest single energy consumers, spending $16 billion in 2012 on transportation fuels and to heat, cool, and light more than 500 U.S. installations in the United States, including nearly 300,000 buildings covering 2.3 billion square feet.[107, 108]

LT. GEN. RICHARD ZILMER
U.S. Marine Corps

Still, that enormous financial price tag only begins to tell the story of our national security leaders' new concern over energy.

> This is a problem that will bring the U.S. economy to its knees.
>
> *Lt. Gen. Richard Zilmer, U.S Marine Corps*

In recent years, high-ranking military officers have called attention to the problem with increasingly urgent language.

In an interview with Cater Communications, retired Lt. Gen. Richard C. Zilmer called America's dependence on oil "a national security issue, a threat of the highest order… a problem that will bring the U.S. economy to its knees."

Zilmer and his colleagues on CNA's Military Advisory Board, a group of retired high-ranking military leaders, with combined experience of over 400 years in the

military, studied America's energy posture and found that it constitutes a serious and urgent threat to national security – militarily, diplomatically, and economically. In particular, our overdependence on and inefficient use of oil undermines foreign policy, entangles American with unstable and often hostile regimes, undermines combat effectiveness, and exacts a huge price tag – in dollars and lives.

Zilmer served as Commanding General of Multi-National Force - West in Al Anbar Province, Iraq, in support of Operation Iraqi Freedom, and saw firsthand the human price tag our overdependence on oil was exacting from his combat troops.[109] Transporting fuel to forward operating bases had become one of the most lethal jobs in the military. In 2006, Zilmer issued a joint urgent operational needs statement that identified increasing onsite renewable energy and efficiency as well as reducing oil dependence as critical to the warfighter.[110, 111]

> The average soldier in WWII required about one gallon of fuel to support his operations. You fast forward to our experiences in Iraq or Afghanistan, it's somewhere in the order of about 22 gallons to support the same thing. We fight with a new age of equipment technology that requires energy.
>
> ***Lt. Gen. Richard Zilmer, U.S Marine Corps***

As an Air Force officer serving in both Iraq and Afghanistan, Brian Smith worked on finding new technologies to solve this and other military energy dilemmas. At the height of the Iraq war, as Smith told Cater Communications, the United States shipped more than two million gallons a day of oil within that country, with the convoys and logistics patrols involved all targets of rebel roadside bombs.[112] What outraged Smith in particular was how much of that oil was wasted, even as lives were lost to secure it. "It was primarily being used to… power air-conditioning units," he said. "And those air-conditioning units were cooling off tents that weren't insulated… so we're essentially air-conditioning the desert."

Apart from the human toll of such waste, it's been clear for many years now that the fluctuating price of oil on world markets also threatens America's economic stability, which is critical to national security.

And increasingly over the past decade, national security experts have issued warnings about the national security risks of climate change, and the extreme weather events it causes.

The first major and public sign of this concern came in 2003, during the Bush Administration, when a specially commissioned Pentagon report urged that climate change be "elevated beyond a scientific debate to a U.S. national security concern." The report warned that climate change could "potentially destabilize the geo-political environment, leading to skirmishes, battles, and even war" over scarce food, water, and energy sources.[113]

Since that time, a series of reports by the CNA Military Advisory Board has called climate change a "threat multiplier," capable of exacerbating conflicts around the world. CNA members have also toured the nation to talk to public audiences and editorial boards. The National Intelligence Assessment, finalized by the Bush Administration in 2008, reinforced the MAB's findings. And the 2010 Quadrennial Defense Review (QDR) identified climate change as a destabilizing agent.

> From a national security point of view, energy independence should be our number one priority.
>
> *Sen. Lindsey Graham, R-S.C.*

In 2010, the drumbeat of worry led to some revolutionary change. A memo of understanding signed that year by both the Department of Defense and Department of Energy said that energy efficiency can serve as a "force multiplier," reducing long-term energy costs while increasing the range and endurance of forces in the field.[114] Also in 2010, the Pentagon invested $2.7 billion to improve energy efficiency, with new lighting, heating, and air-conditioning systems, in addition to more renewable power from solar, wind, and geothermal energy. Much of that money came from the federal stimulus funds, which in 2009 directed a total of $3.6 billion for military energy efficiency.[115]

At the time, Joe Sikes, facilities director at the Defense Department, said the military's efforts would result in at least $1.6 billion in savings through the projects' lifetimes.[116] While that falls well short of net economic savings, Pentagon officials have other goals in mind, including becoming more independent of the power grid, protecting installations against blackouts and other disruptions, and testing new technologies that may ultimately advance U.S. leadership in a rapidly emerging new industry.

Over the past decade, again in rare exceptions to the gridlock on energy policy, Congress and Presidents Bush and Obama have set ambitious targets for the military to reduce energy waste and adopt cleaner, renewable power. The Energy Policy Act of 2005, for instance, requires the DOD across the board to consume more electric energy from renewable sources. The Energy

Independence & Security Act of 2007 calls on the armed forces to reduce the energy intensity of its facilities, relative to an FY2003 baseline. And while Congress has so far failed to set a national renewable energy standard, it succeeded in giving the military one, requiring the DOD to draw 25 percent of its energy from renewable sources by 2025.

Other military energy goals are equally ambitious. The U.S. Army aims to have net-zero greenhouse gas emissions by 2030 and to get one gigawatt of its power – enough to supply one million homes[117] – from clean sources by 2025. The Navy intends to have half of its power generated by renewable energy by 2020.[118]

> As a nation and as a Navy and Marine Corps, we simply rely too much on a finite and depleting stock of fossil fuels that will most likely continue to rise in cost over the next decades. This creates an obvious vulnerability to our energy security and to our national security and to our future on this planet.
>
> *U.S. Navy Secretary Ray Mabus*

At this writing the Pentagon has missed some of its interim energy targets, though it has made some notable progress. By the end of 2011, for instance, the DOD had improved its energy efficiency by 13.3 percent over the 2003 baseline – a rate twice as fast as the general economy, although well short of its goal of 18 percent improvement by that time. And as of 2011, the DOD reported getting 8.5 percent of its electricity from clean sources, while the Navy got more than 20 percent.[119]

Meanwhile, the military continues to set itself bold energy goals.

In 2008, for example, the DOE and DOD established a joint initiative to create Net Zero energy installations throughout the military services (see our case study on Parris Island), while stepping up the overall rate of increased energy efficiency and clean power.

The template net-zero project is the U.S. Marine Corps Air Ground Combat Center Base in the Mojave Desert town of Twentynine Palms, north of San Diego, which is fast approaching its goal of being able to operate entirely off the electric grid. By 2012, the base had reduced its total energy use by 43 percent, primarily by cutting waste and adding more than 10 MW of on-site solar power and a 7.2 MW co- generation plant. The base serves a population of more than 27,000 military and civilian personnel, who support Marine training exercises while, more recently, serving as an incubation lab for new technologies including microgrids and “smart” grids.[120]

The armed forces in general are providing this incubator role increasingly when it comes to cutting-edge energy-efficiency technology. A 1990s-era program called the Environmental Security Technology Certification Program focuses on having the DOD demonstrate and ideally scale up potentially transformational technologies, including microgrids and new energy-monitoring and storage systems.[121] This role is no departure from the military's history: over the past century, the military has helped develop and deploy radar and the Internet, among other innovations. And now, with energy, the military's influence may be just as groundbreaking. For instance, the Department of Energy now predicts the cost of advanced biofuels will fall by nearly 50 percent by 2017, in the wake of the extensive research and development by the armed forces.[122, 123]

BRIAN SMITH
Midwest Chairman for Young Conservatives for Energy Reform

Some of the most striking military progress to date has been made under the leadership of Navy Secretary Ray Mabus. In 2009, Mabus introduced new efficiency goals including creating a "Green Strike Group" of vessels powered by biofuels, cutting petroleum use by commercial Navy vehicles in half by 2015, significantly increasing renewable energy generation, and considering lifetime energy costs when the Navy and Marine Corps award contracts.[124] At the time, Mabus declared that "as a nation and as a Navy and Marine Corps, we simply rely too much on a finite and depleting stock of fossil fuels that will most likely continue to rise in cost over the next decades," adding, "This creates an obvious vulnerability to our energy security and to our national security and to our future on this planet."[125]

As one immediate and clear result of the general redirection in U.S. military energy policy, U.S. fuel convoys are now much safer. Brian Smith, the former Air Force officer, eventually succeeded in convincing military officers to insulate the temporary tents in which oil-fueled systems were "air-conditioning the desert." Combined with the addition of solar panels at the bases, such measures have helped reduce fuel use in the field by 50 percent. Smith today is Midwest Chairman of Young Conservatives for Energy Reform.

New Fuels for Schools

America's schoolrooms have been particularly lively stages for the nation's clean energy revolution. On K-12 and college campuses, conservatives and liberals have engaged in extraordinary collaboration, with the shared goals of making schools healthier and more cost-effective by increasing clean energy and energy efficiency.

The need for smarter energy strategies in America's 133,000 K-12 schools and 4,300 colleges and universities schools couldn't be clearer. All told, these facilities annually spend more than $7.5 billion on energy.[126] At the same time, so many of the buildings involved are in such poor repair that it's been estimated that it would take somewhere near $400 billion just to bring them to the point of not violating the law. Some 15,000 schools have indoor air quality deemed unfit to breathe.[127]

It's a rich target for improvement, with a large, mostly young, and vocal constituency.

Twenty-five percent of Americans – more than 70 million people[128] – go to school every day. More than half of U.S. households include at least one student. The combination of moral imperative to care for youth and the fiscal imperative to keep utility bills down has proven to be a great incentive for bipartisan collaboration.

"The universal value that we all share, of healthy, high-performing kids, has bridged the partisan divide, and opened people's minds to the dollar-savings involved," says Rachel Gutter, director of the Center for Green Schools, a wing of the U.S. Green Building Council.

> By building green schools, you can save money and help the environment at the same time. Whether you're a Republican or Democrat, this is something you can get your arms around.
>
> *State Rep. Jim DeCesare, R-Ky.*

Mostly over the past six years, about 80 percent of the largest U.S. school districts have committed to building "green schools." In Kentucky, Republican state Rep. Jim DeCesare has become an extraordinary proponent of this philosophy. DeCesare and his Democratic colleague, state Rep. Mary Lou Marzian, convinced their peers in the Kentucky General Assembly to unanimously adopt resolutions in support of green schools, reaching not only across party divisions, but also across state lines.

In 2011, the two hosted a bipartisan group of lawmakers from six states to discuss ways to further such collaboration. The meeting took place at Kentucky's Richardsville Elementary, the nation's first school to achieve "net-zero" status, meaning it supplies all the energy it needs on-site.[129] The school is in Warren County, where the public school system instituted an energy management plan in 2003, and calculates it has since saved more than $6 million – enough to fund more than 160 teacher positions.

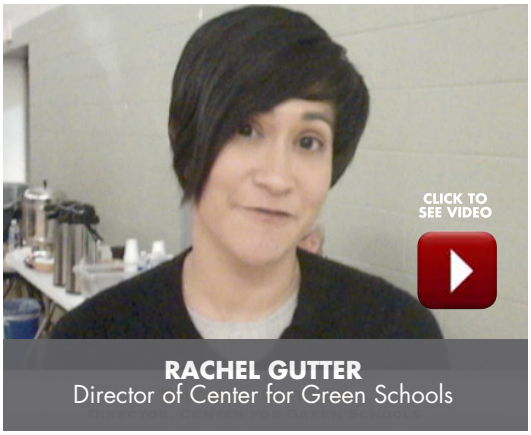
"By building green schools, you can save money and help the environment at the same time," says DeCesare. "Whether you're a Republican or Democrat, this is something you can get your arms around."

Over just the past few years, increasing numbers of school districts throughout America have been building and remodeling schools with the economy and environment in mind, and with special attention to energy use. Now, one to two new schools that meet LEED building standards are being built each day, using on average 33 percent less energy and 32 percent less water, thus saving an estimated $100,000 per year in operating costs. That's enough to hire at least one new teacher, buy 200 new computers, or purchase 5,000 textbooks.[130]

Many state governments have given the movement strong support. By the end of 2012, 13 states and the District of Columbia had adopted green-school policies for new construction.[131, 132]

Some school officials in states without mandates say they have built to LEED standards without seeking the certification. Some have chosen other kinds of validation, such as the U.S. Energy Star program. Schools can get an Energy Star label if they rank in the top 25th percentile of all schools for energy performance. In 2011, more than 1,600 schools received the label.

A significant collateral benefit of the green-school trend is that increasing numbers of students are becoming familiar with the energy technologies of the future. At Paradise Elementary School in southern Pennsylvania, for example, children have been learning about geothermal power, which provides heat for their classrooms, while saving money and improving reliability.

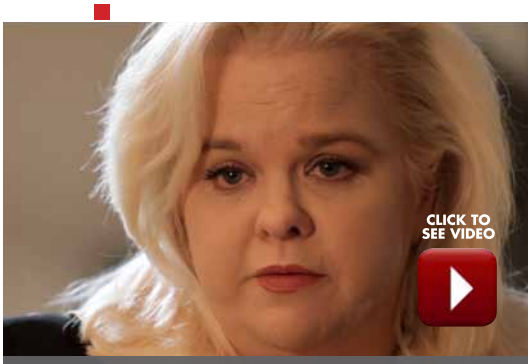


Of course, from a student's viewpoint, that may not be an unequivocal improvement, notes John Bowden, the district's chief operating officer. "When the boilers break down, classes get canceled," Bowden says, grinning. "But these geothermal wells are a lot more reliable, meaning the kids don't get those days off."

Rachel Gutter, director of the Center for Green Schools, says the movement has helped bring Republicans and Democrats together, despite the politicized debate over most environmental issues. "It's an education moment, since it turns out that this is a win for everyone," she says.

> Preservation of our environment is not a partisan challenge; it's common sense. Our physical health, our social happiness, and our economic well-being will be sustained only by all of us working in partnership as thoughtful, effective stewards of our natural resources.
>
> ***Ronald Reagan***

It's Not *All* Bad News Inside the Beltway



MICHELE COMBS
President of
Young Conservatives for Energy Reform

Considering the manifest benefits available from clean energy, and particularly from increasing energy productivity, it's difficult and often frustrating for many Americans living outside of Washington, D.C., to understand why both Republicans and Democrats in Congress have allowed clean energy reform to be portrayed as a purely Democratic issue.

Rep. Cory Gardner, the Republican congressman from Colorado, has been one of the few outspoken conservative advocates for more decisive action – a position he has wryly described as "living dangerously."

"I tell my colleagues to not let the hair on the back of your neck bristle anytime someone mentions green energy," he said in a recent interview with Cater Communications. "If you can figure out how to make a better, cleaner product, why not pursue it? And if you can make it out of a renewable source, isn't that better than one that can be depleted?"

As Rep. Gardner reminded us, 'green' didn't used to be exclusively blue. Republican Theodore Roosevelt established the U.S. Forest Service and set aside 150 million acres of timberland as public domains, creating 50 wildlife refuges and five national parks during his tenure as President.

> If you look historically at issues of conservation and energy, there's been a lot of Republican leadership …The things that I've taken part in, they've been done in a bipartisan spirit … It seems to me we need to get the partisanship out of it.
>
> *Former Secretary of State George Shultz*

Roosevelt warned at the time that Americans needed to consider "what will happen when our forests are gone, when the coal, the iron, the oil and the gas are exhausted, when soils have been… washed into the streams, polluting the rivers…"[133]

Richard Nixon signed the Clean Air Act and created the EPA. Earth Day was a bipartisan idea. Ronald Reagan memorably argued that, "Preservation of our environment is not a partisan challenge; it's common sense. Our physical health, our social happiness, and our economic well-being will be sustained only by all of us working in partnership as thoughtful, effective stewards of our natural resources."[134] And George W. Bush complained that America "is addicted to oil."[135]

Somehow, as politics inside the Beltway have become increasingly polarized, conservative leaders have lost sight of this powerful legacy. Yet Rep. Gardner and a few courageous colleagues hope to change that.

Late in 2012, Gardner teamed up with Democratic Rep. Peter Welch (D-Vt.) to recruit four other Republicans and five Democrats to a new Energy Savings Performance Caucus, to improve energy thrift in federal buildings. The two caucus leaders have already offered amendments to several appropriations bills, which encourage federal agencies to expand their use of energy savings performance contracts, which as discussed earlier, provide efficiency upgrades with no upfront costs. Retrofit experts estimate that these contracts could save up to $20 billion.

"On efficiency, we're united, and we want to keep focused on that and bring our colleagues on both sides of the aisle into the benefits of it," Gardner told a news conference in December of 2012.[136]

Another member of Gardner's caucus is fellow Republican Joe Wilson, who praised the solar power installations on Parris Island described earlier in this report. "Energy efficiency is an extremely important issue that directly affects our national security," Rep. Wilson told Cater Communications in early 2013. "Throughout the remainder of this Congress, I look forward to working with my colleagues on both sides of the aisle to ensure that we do everything that we can to protect American families and our national security."

An earlier bipartisan caucus on energy issues convened in July 2011 to support "green schools." The group has been co-chaired by Rep. Robert Dold (R-Ill.) and Rep. Jim Matheson (D-Utah), and has convened 70 members willing to work together to make schools more clean and energy efficient.

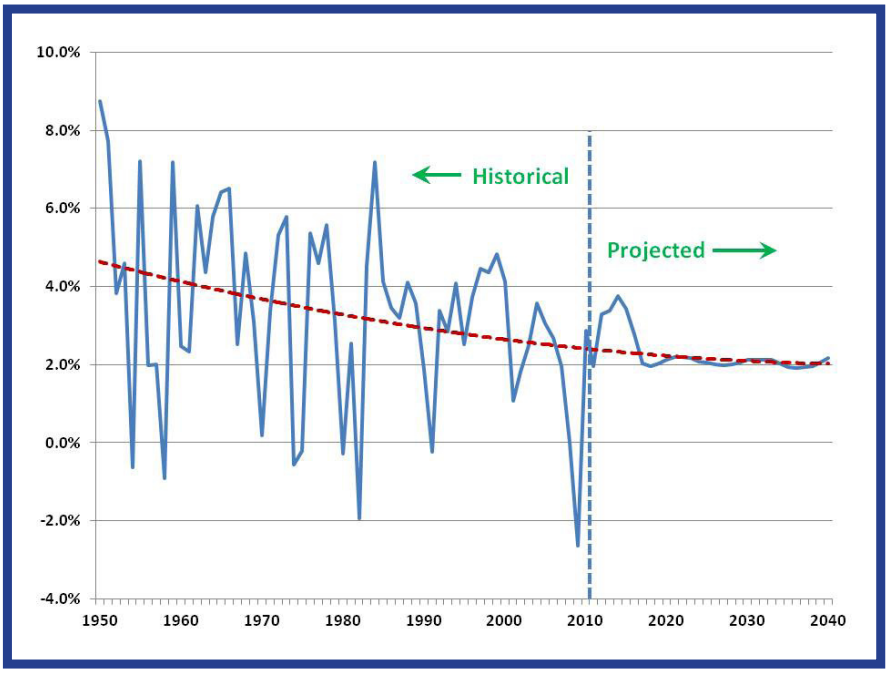
Modest legislative progress came in December of 2012, when President Obama signed H.R. 6582, the American Energy Manufacturing Technical Corrections Act.[137] The new law includes some measures pulled from a bipartisan bill by Senators Jeanne Shaheen (D-N.H.) and Rob Portman (R-Ohio). For instance, it sets standards for federal energy management and data collection, and establishes best practices for advanced metering within the federal government.

More auspiciously, as of this writing the broader-reaching Shaheen-Portman bill has been reintroduced to the Senate, with new hopes that it may be approved by the end of 2013.[138] The bipartisan bill includes new energy efficiency measures in building codes, new efficiency measures for the federal government, and incentives for energy-efficiency upgrades at industrial facilities.[139]

To be sure, these measures barely begin to approach the scope of America's energy challenges. Much more will be needed to take advantage of the huge opportunities awaiting to boost efficiency, save money, increase consumer control over power, reduce pollution and grow the economy.

What's Next?

U.S. AVERAGE ANNUAL ECONOMIC GROWTH RATES 1950-2040



JONOTHAN BRUNSON
National Youth Director for the Christian Coalition

Houston – and Denver, and New York, San Francisco, Minnesota, and, for that matter, every other big U.S. city and small town – we've got a problem.

Despite the recent stock-market surge and new signs of life from the housing market, current long-term projections for national economic growth are pretty dismal. Americans have gotten used to thinking that our economy will continue to grow at least slightly more than the growth in population, continuing to provide new jobs. Yet experts warn that under current business as usual, that's not at all likely.

George Mason University economist Tyler Cowen elaborated on this theme in his widely discussed 2011 book, "The Great Stagnation." Cowen warns that Americans have been living off of low-hanging fruit, economically speaking, for the past 300 years.[140]

The problem is that all that fruit is nearly gone.

In this view, Cowen, a conservative, coincides with Jeremy Rifkin, a liberal. Both argue that it's time for a dramatic course-correction, with new thinking and substantial new investment aimed at avoiding the risks of what could easily become a "new normal" of low or no growth, with the consequent dangers of falling employment and social unrest.

Where should all that new investment go, to have the greatest impact? You guessed it: energy efficiency. Efficiency historically has been closely linked with productivity, growth, and new jobs.

If America can truly rev up energy efficiency, leading energy experts believe we have the potential to reduce our cumulative energy consumption by half as we nearly triple the size of the economy.[141]

In 2009, the McKinsey consultancy firm said that with a $520 billion investment, the U.S. economy could reduce its yearly non-transportation energy consumption by roughly 23 percent by 2020, eliminating more than $1.2 trillion in waste.[142] An additional benefit would be the reduction of more than a gigaton of greenhouse gas emissions every year, equal to taking the entire US fleet of passenger vehicles and light trucks off the roads.

The mine of riches in this scenario is the more than 86 percent of energy that America wastes every year.[143] It represents a huge opportunity for putting people to work throughout the economy.

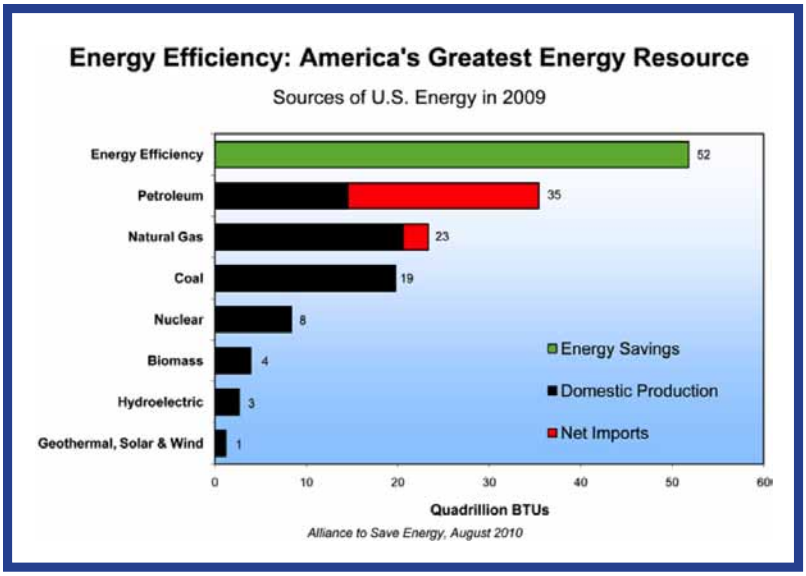
Seeking New Savings: How We Achieve a Low-Waste, High-Performance Economy

Powering Up on a larger scale could dramatically transform our nation's prospects.

- Energy efficiency upgrades to U.S. buildings could yield $1 trillion in savings over 10 years.[144]
- U.S. schools have an estimated $271 billion in deferred maintenance – $5,000 per student just to bring them up to code. This represents a particularly rich mine of potential for energy-efficient upgrades.[145]
- The 370,000 worship centers throughout the United States could collectively save nearly $630 million by cutting energy use by 20 percent.[146]
- Targeting energy-efficiency measures in the southern United States and the District of Columbia – a region that remains the nation's richest trove of waste – could lower annual electric bills by a collective $41 billion and create 380,000 new jobs.[147]

Similarly, there are some promising trends encouraging clean energy – assuming that America's political leaders find the right incentives.

- The U.S. Department of Energy estimates that wind could provide 20 percent of U.S. electricity as soon as by 2030.[148]
- The National Renewable Energy Laboratory produced the first hour-by-hour, region-by-region electricity assessment and found that we could keep the lights on using 80 percent clean energy by 2050, with technologies available today.[149]



More and more Americans are speaking up about what can and needs to be done to grow our economy, create jobs, cut waste, and clean up our atmosphere.

Roberta Combs, president of the Christian Coalition, with millions of members nationwide, says her organization has been compiling surveys of her members' attitudes on energy independence, national security, and clean air, and finding everywhere that people care very deeply. Respondents, she says, want to know more – so much so that she began a project, called America's Path to Progress, to encourage education and activism on energy reform. "Legislators should check their hearts and say, 'We care about America,'" Combs said. "'We're no longer going to listen to interest groups…. We want to come together and we want to be energy independent.'"[150]

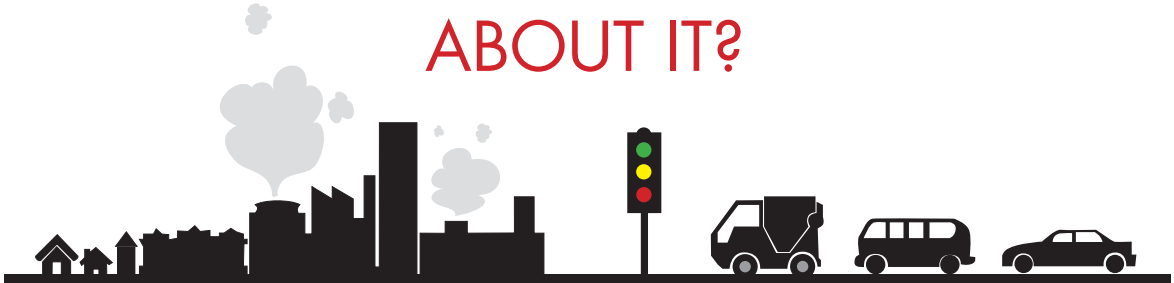
Lt. Gen. Richard Zilmer, who has been touring America in recent years with his high-ranking military colleagues to speak out on clean energy, shares Combs' impatience. "Why can't we get traction, why can't we elevate this as a strategic challenge to the United States of America?" he asks rhetorically, adding, "We're trying to get past gridlock, we're trying to develop this spirit of cooperation and compromise… and we have to be able to explain that this is not a partisan interest, this is not an issue that is the province of a particular party, this is a problem that knows no bounds politically."[151]

What Combs and Zilmer and millions of Americans agree on is that our nation can no longer afford an intermittent response to our energy crises, in which as soon as the price of oil or electricity goes down, we get back to squandering precious resources.

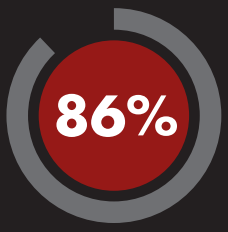
What would it take to develop this longer, steadier view – a strategy that can cross state and political party lines and generational boundaries? Zilmer summed it up in three words: "Leadership, leadership, leadership."

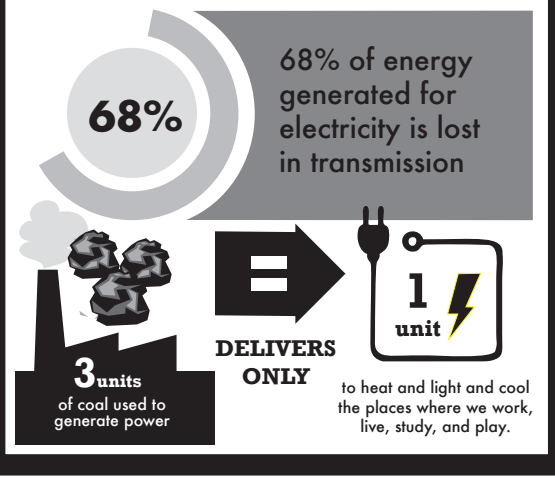
WHERE'S THE WASTE?

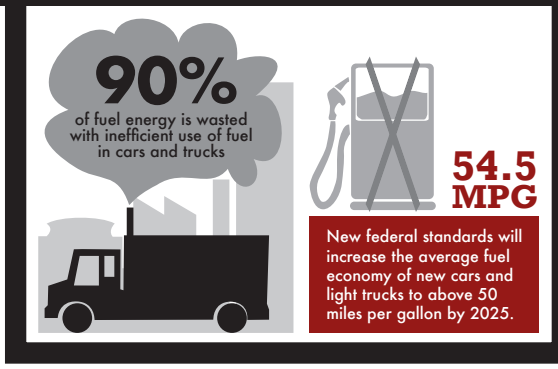
AND WHAT CAN WE DO ABOUT IT?

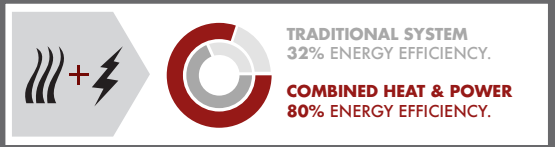


The American economy currently wastes **86%** of the energy we consume

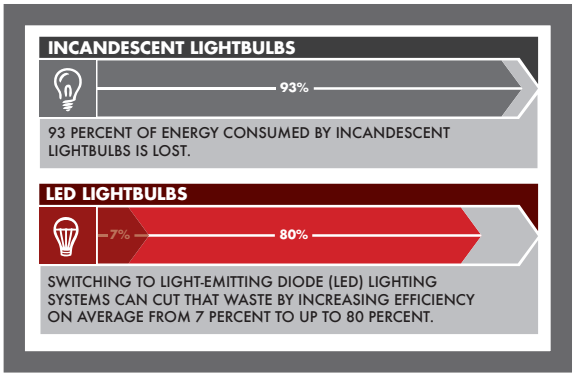








Combined Heat and Power systems, built on-site to use the heat created by producing power, can improve energy efficiency from this average of 32 percent to up to 80 percent.



End Notes

1 "National Defense and the Threat of Climate Change," CNA's Military Advisory Board, April 2007, http://www.cna.org/sites/default/files/National%20Security%20and%20the%20Threat%20of%20Climate%20Change%20-%20Print.pdf.

"Powering America's Defense: Energy and the Risks to National Security," CNA's Military Advisory Board, May 2009, http://www.cna.org/sites/default/files/Powering%20Americas%20Defense.pdf.

"Powering America's Economy: Energy Innovation at the Crossroads of National Security Challenges," CNA's Military Advisory Board, July 2012, http://www.cna.org/sites/default/files/research/WEB%2007%2027%2010%20MAB%20Powering%20America%27s%20Economy.pdf.

"Ensuring America's Freedom of Movement: A National Security Imperative to Reduce U.S. Oil Dependence," CNA's Military Advisory Board, October 2011, http://www.cna.org/sites/default/files/MAB4.pdf

2 "Facility Type: K-12 Schools," ENERGY STAR, November 2006, http://www.energystar.gov/index.cfm?c=business.EPA_BUM_CH10_Schools.

3 Robert U. Ayres and Edward H. Ayres, *Crossing the Energy Divide: Moving from Fossil Fuel Dependence to a Clean-Energy Future* (New Jersey: Pearson, 2009).

4 Jim Witkin, "Q&A: 'Crossing the Energy Divide', review of "Crossing the Energy Divide" by Robert U. Ayres and Edward H. Ayres." *New York Times*, January 19, 2012. http://green.blogs.nytimes.com/2010/01/19/qa-crossing-the-energy-divide/.

5 John A. "Skip" Laitner, Steven Nadel, R. Neal Elliott, Harvey Sachs, and A. Siddiq Khan, "ACEEE Report: U.S. Better Off 'Thinking Big' about Energy Efficiency Instead of Focusing First on Development of New Energy Sources," American Council for an Energy-Efficient Economy, January 12, 2012, http://aceee.org/press/2012/01/aceee-report-us-better-thinking-big-

6 Robert U. Ayres and Edward H. Ayres, *Crossing the Energy Divide: Moving from Fossil Fuel Dependence to a Clean-Energy Future* (New Jersey: Pearson, 2009).

7 Civil Society Institute, "Survey: "Partisan Divide" on Energy Issues is a Myth, Strong Bipartisan Support Seen for Shift to Cleaner Energy," April 25, 2012, http://www.civilsocietyinstitute.org/media/042512release.cfm

8 "Deloitte reSources 2012 Study: Consumer Survey," Deloitte, accessed April 15, 2013, http://www.deloitte.com/view/en_US/us/Insights/centers/centers-center-for-energy-solutions/8e3262fa8b1ae210VgnVCM1000001a56f00aRCRD.htm.

9 "Energy Efficiency: America's Greatest Energy Resource," Alliance to Save Energy, 2012, http://www.ase.org/resources/energy-efficiency-americas-greatest-energy-resource.

10 John "Skip" Laitner (Senior Fellow, American Council for an Energy-Efficient Economy) in discussion with the author, January 2013.

11 "State of the Union," The White House, February 12, 2013, http://www.whitehouse.gov/state-of-the-union-2013.

12 "ACEEE: Massachusetts Sill #1 State for Energy Efficiency, While Oklahoma, Montana, and South Carolina Are Among Most Improved," American Council for an Energy-Efficient Economy, October 3, 2012, https://www.aceee.org/press/2012/10/aceee-massachusetts-still-1-state-en.

13 "U.S. Solar Market Grows 76% in 2012," Distributed Energy, March 14, 2013, http://www.distributedenergy.com/DE/Articles/US_Solar_Market_Grows_76_in_2012_20880.aspx.

[14] "Department of Defense: Energy Management Reports," Office of the Deputy Under Secretary of Defense Installation and Environment, last updated September 24, 2012, http://www.acq.osd.mil/ie/energy/energymgmt_report/main.shtml.

[15] "ENERGY STAR Labeled K-12 Schools," ENERGY STAR, accessed May 7, 2013, http://www.energystar.gov/index.cfm?fuseaction=labeled_buildings.showResults&ALSO_SEARCH_ID=NONE&STARTNUM=1&ZIP=&S_CODE=ALL&CITY=&BUILDING_TYPE_ID=910&STR=&MINI=&YEAR=&PROFILES=0&FILTER_B_ID=&OWNER_ID=&PAGE=1&view=all.

[16] "Game Changer: How the Sports Industry is Saving the Environment," Natural Resources Defense Council, September 2012, http://www.nrdc.org/greenbusiness/guides/sports/files/Game-Changer-report.pdf.

[17] "ENERGY STAR Labeled Houses of Worship," ENERGY STAR Labeled Building & Plants, accessed April 16, 2013, http://www.energystar.gov/index.cfm?fuseaction=labeled_buildings.showResults&SEARCH_PROP_MANAGER_ID=&PROFILES=&YEAR=&S_CODE=ALL&SEARCH_SPP_ID=&SEARCH_OWNER_ID=&CITY=&BUILDING_TYPE_ID=1003&ZIP=&FILTER_B_ID=.

[18] "Sustainability delivers big savings for hospitals," GHP Blog, accessed April 16, 2013, http://greenhospital-blog.com/?p=1498.

[19] Jonathan G. Koomey, "Worldwide electricity used in data centers," IOPScience Environmental Research Letters Vol. 3, No. 3, May 9, 2008, http://iopscience.iop.org/1748-9326/3/3/034008/pdf/1748-9326_3_3_034008.pdf.

[20] John Wagner, "Accusations Traded on Electric-Rate Issue," *The Washington Post*, September 15, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/09/14/AR2006091401615.html.

[21] Brad Plumer, "The biggest fight over renewable energy is now in the states," *The Washington Post*, March 25, 2013, http://www.washingtonpost.com/blogs/wonkblog/wp/2013/03/25/the-biggest-fights-over-renewable-energy-are-now-happening-in-the-states/.

[22] "Lobbying: Oil & Gas," Center for Responsive Politics, last updated March 4, 2013 http://www.opensecrets.org/lobby/indusclient.php?id=E01.

[23] Brad Plumer, "The biggest fight over renewable energy is now in the states," *The Washington Post*, March 25, 2013, http://www.washingtonpost.com/blogs/wonkblog/wp/2013/03/25/the-biggest-fights-over-renewable-energy-are-now-happening-in-the-states/.

[24] "State Energy Efficiency Policy Database," American Council for an Energy-Efficient Economy, 2013, http://aceee.org/topics/eers.

[25] "State Energy Efficiency Resource Standards Analysis," U.S. Department of Energy, July 2010, http://www1.eere.energy.gov/manufacturing/states/pdfs/eers_web_final.pdf.

[26] Silvio Marcacci, "Diverse Funding Streams Foot the Bill," *Cleantechnica*, December 27, 2012, http://cleantechnica.com/2012/12/27/energy-efficiency-saves-new-england-260-million-in-transmission-costs/.

[27] Brad Plumer, "Cap-and-trade is still alive in New England. Is it working?," *The Washington Post*, February 9, 2013, http://www.washingtonpost.com/blogs/wonkblog/wp/2013/02/09/cap-and-trade-is-still-alive-in-new-england-is-it-working/.

[28] "The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States," Analysis Group, November 15, 2011, http://www.analysisgroup.com/rggi.aspx.

[29] "State of the State Address of Governor Mary Fallin," Governor Mary Fallin, accessed April 24, 2013, http://www.ok.gov/governor/State_of_the_State_Address.html.

[30] "State Energy Efficiency Policy Database," American Council for an Energy-Efficient Economy, June 13, 2012, http://aceee.org/energy-efficiency-sector/state-policy/North%20Carolina/205/all/202.

[31] "Building Codes for Energy Efficiency," Environmental Protection Agency, accessed April 24, 2013, http://www.epa.gov/cleanenergy/documents/suca/buildingcodesfactsheet.pdf.

[32] Jeff St. John, "Efficiency Retrofits Could Save US $1T in Energy," *Greentech Media*, Marcy 14, 2012, http://www.greentech-media.com/articles/read/efficiency-retrofits-could-save-u.s.-1t-in-energy.

[33] "New Fund Unlocks $150 Billion in Efficiency Savings," CalCEF, March 13, 2013, http://calcef.org/2013/03/13/pr-hinkle3/.

[34] "National Association of Energy Service Companies, http://www.naesco.org/resources/esco.htm.

[35] "Most states have Renewable Portfolio Standards," U.S. Energy Information Administration, February 3, 2012, http://www.eia.gov/todayinenergy/detail.cfm?id=4850.

[36] "Increasing the Texas Renewable Energy Standard: Economic and Employment Benefits," Union of Concerned Scientists, February 2005, http://www.ucsusa.org/assets/documents/clean_energy/texas_res_report-02-05_final.pdf.

[37] "Texas is the national leader in wind installations and is a manufacturing hub for the wind energy industry," American Wind Energy Association, 2012, http://www.awea.org/learnabout/publications/factsheets/upload/3Q-12-Texas.pdf.

[38] "Texas Renewable Energy Industry Report," The State of Texas Office of the Governor, July 2012, http://governor.state.tx.us/files/ecodev/Renewable_Energy.pdf.

[39] "Careers in Wind Energy," Bureau of Labor Statistics, accessed April 24, 2013, http://www.bls.gov/green/wind_energy/.

[40] "May 2012 National Industry-Specific Occupational Employment and Wage Estimates – Coal Mining," Bureau of Labor Statistics, May 2012, http://www.bls.gov/oes/current/naics4_212100.htm.

[41] "Wind Energy Facts: Iowa," American Wind Energy Association, October 2012, http://www.awea.org/learnabout/publications/factsheets/upload/3Q-12-Iowa.pdf.

[42] J. Matthew Roney (April 6, 2012). "Wind Energy Tops 10 Percent Share of Electricity in Five U.S. States". REVE.

[43] Walter C. Jones, "Brownback calls for renewal of wind tax credit," *The Topeka Capital-Journal*, June 4, 2012, http://cjonline.com/news/2012-06-04/brownback-calls-renewal-wind-tax-credit.

[44] Scott Rothschild, "Wind energy powering jobs, revenue, report says," *Lawrence Journal-World*, November 19, 2012, http://www2.ljworld.com/weblogs/capitol-report/2012/nov/19/wind-energy-powering-jobs-revenue-report/?c=2188887.

[45] Brent D. Wistrom, "Effort to push back renewable energy requirements fails in House committee," *The Witchita Eagle*, March 20, 2013, http://www.kansas.com/2013/03/19/2723047/effort-to-push-back-renewable.html#storylink=cpy.

[46] "Energy Progress: Economic Impacts," Kansas 4 Clean Energy, accessed April 24, 2013, http://kansans4cleanenergy.org/cep/static/docs/economic_impacts_final_web.pdf.

[47] "National Report: Arizona #2 in Solar Energy Development," State of Arizona Office of the Governor, September 11, 2012, http://azgovernor.gov/dms/upload/PR_091112_SolarReport.pdf.

[48] "Nevada State of the State Address," State of Nevada, 2011, http://www.leg.state.nv.us/Session/76th2011/SOS/SOSSandoval2011.pdf.

[49] "Governor Christie Builds on Record of Growing Renewable Energy Sources with Action to Strengthen Solar Market," State of New Jersey, July 23, 2012, http://www.nj.gov/governor/news/news/552012/approved/20120723a.html.

[50] "Chris Christie on Energy & Oil," On the Issues, July 26, 2011, http://www.ontheissues.org/2012/Chris_Christie_Energy_+_Oil.htm.

[51] "Energy in the Executive," *The Wall Street Journal*, October 19, 2012, http://online.wsj.com/article/SB10000872396390444734804578062721764365776.html.

[52] Ben Sills and Marc Roca, "Solar's 80% Plunge Hurts Utilities from Hawaii to Spain," *Bloomberg*, March 20, 2012, http://www.bloomberg.com/news/2012-03-21/grid.html.

[53] "Levelized Cost of Energy Analysis—Version 6.0," *Lazard*, June 2012, https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/PAC/2012/20121221/20121221%20PAC%20Supplemental%20Levelized%20Cost%20of%20Energy%20Analysis.pdf.

[54] "Georgia Power commits to wind energy," Atlanta Business Chronicle, April 22, 2013, http://www.bizjournals.com/atlanta/news/2013/04/22/georgia-power-commits-to-wind-energy.html.

[55] "Wind energy top source for new generation in 2012; American wind power installed new record of 13,124 MW," American Wind Energy Association, January 30, 2013, http://www.awea.org/newsroom/pressreleases/officialyearendnumbersreleased.cfm.

[56] Clint Wilder, "It's Rocky, but Our Transition to Clean Energy is Well Under Way," *Clean Edge*, February 26, 2013, http://www.cleanedge.com/resources/views/its-rocky-but-our-transition-to-clean-energy-is-well-underway.

[57] Diane Cardwell, "Solar Trade Group Reports Surge in U.S. Installations," *The New York Times*, March 13, 2013, http://www.nytimes.com/2013/03/14/business/energy-environment/solar-group-reports-surge-in-us-installations.html?_r=0.

[58] "New Report: 3rd Quarter U.S. Solar Energy Growth Highlighted by PV, Record Residential Installs," Solar Energy Industries Association, December 11, 2012, http://www.seia.org/news/new-report-3rd-quarter-us-solar-energy-growth-highlighted-pv-record-residential-installs

[59] "Levelized Cost of Energy Analysis—Version 6.0," *Lazard*, June 2012, https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/PAC/2012/20121221/20121221%20PAC%20Supplemental%20Levelized%20Cost%20of%20Energy%20Analysis.pdf.

[60] "How much electricity does an American home use?" U.S. Energy Information Administration, March 19, 2013, http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3.

[61] Southwest Energy Efficiency Project, http://www.swenergy.org/programs/utilities/20BBonanza.htm.

[62] Emily Badger, "Energy-Efficient Homes Are Much Less Likely To Go Into Default," *The Atlantic*, March 19, 2013, http://www.theatlanticcities.com/housing/2013/03/energy-efficient-homes-are-much-less-likely-go-default/5025/.

[63] "The Toll from Coal: An Updated Assessment of Death and Disease from America's Dirtiest Energy Source," *Clean Air Task Force*, September 2010, http://www.catf.us/resources/publications/files/The_Toll_from_Coal.pdf.

[64] John A. Romley, Andrew Hackbarth, Dana P. Goldman, "The Impact of Air Quality on Hospital Spending," RAND Corporation, 2010, http://www.rand.org/pubs/technical_reports/TR777.html.

[65] "Respiratory Health & Air Pollution," Center for Disease Control and Prevention, October 15, 2009, http://www.cdc.gov/healthyplaces/healthtopics/airpollution.htm.

[66] "Asthma in the US: Growing every year," Centers for Disease Control and Prevention, May 2011, http://www.cdc.gov/vitalsigns/asthma/.

[67] Jason Walsh (Senior Advisor, Energy Efficiency & Renewable Energy, U.S. Department of Energy) in discussion with the author, January 2013.

[68] Brad Johnson, "Lindsey Graham Rebukes Fellow Republicans: 'The Green Economy is Coming'," *Climate Progress*, November 4, 2009, http://thinkprogress.org/climate/2009/11/04/174478/graham-green-economy/.

[69] "Southeast Energy Efficiency Alliance Applauds Gov. Haley's Signing of Bill to Update South Carolina Building Energy Codes," Southeast Energy Efficiency Alliance, April 2, 2012, http://engage.ase.org/site/MessageViewer?dlv_id=0&em_id=4402.0.

[70] "South Carolina: State Profile and Energy Estimates," U.S. Energy Information Administration, July 2012, http://www.eia.gov/state/?sid=SC.
"Scana ends dispute over early nuclear costs," Reuters, March 29, 2012, http://www.reuters.com/article/2012/03/29/utilities-scana-idAFL2E8ETCU220120329?sp=true.

[71] "Chapter 39 Renewable Energy and Energy Efficiency Portfolio Standard," South Carolina General Assembly, Marcy 22, 2011, http://www.scstatehouse.gov/sess119_2011-2012/bills/719.htm.

[72] "South Carolina: State Profile and Energy Estimates," U.S. Energy Information Administration, July 2012, http://www.eia.gov/state/?sid=SC.

[73] "S.C. offshore wind farm would generate thousands of jobs, Clemson study shows," *Clemson University Newsroom*, October 4, 2012, http://www.clemson.edu/media-relations/4495.

[74] Ben Tribbett, "Southern States are the 'Saudi Arabia of Energy Efficiency' Savings" *The Huffington Post*, April 14, 2010, http://www.huffingtonpost.com/ben-tribbett/southern-states-are-the-s_b_537914.html.

[75] Ibid

[76] "Conservative South Carolina Republican Going Nationwide with Clean Energy Plan," *Cleantechnica*, July 24, 2012, http://cleantechnica.com/2012/07/24/conservative-s-carolina-republican-going-nationwide-with-clean-energy-plan/#vHho761JtdCFd5Ou.99.

[77] "Unemployment – Seasonally Adjusted, South Carolina," Google Public Data, Accessed April 24, 2013, https://www.google.com/publicdata/explore?ds=z1ebjpgk2654c1_&met_y=unemployment_rate&idim=state:ST450000&fdim_y=seasonality:S&dl=en&hl=en&q=unemployment%20south%20carolina%20statistics#!ctype=l&strail=false&bcs=d&nselm=h&met_y=unemployed&fdim_y=seasonality:S&scale_y=lin&ind_y=false&rdim=country&idim=state:ST450000&ifdim=country&hl=en_US&dl=en&ind=false.

[78] "On-Bill Financing for Energy Efficiency Improvements," *American Council for an Energy-Efficient Economy*, 2011, http://aceee.org/sector/state-policy/toolkit/on-bill-financing.

[79] "South Carolina," United States Census Bureau, March 14, 2013, http://quickfacts.census.gov/qfd/states/45000.html.

[80] "Early 'Help My House' findings project excellent results," Help my House!, July 27, 2012, http://helpmyhouse.coopwebbuilder.com/content/early-help-my-house-findings-project-excellent-results.

[81] "H.R. 4785 (111th): Rural Energy Savings Program Act," govtrack.us, accessed April 24, 2013, http://www.govtrack.us/congress/bills/111/hr4785.

[82] "Joe Wilson on Energy & Oil," On the Issues, accessed April 24, 2013, http://www.ontheissues.org/house/Joe_Wilson_Energy_+_Oil.htm.

[83] "The U.S. Military's Secret Weapon: Going Green," *Yahoo! News*, August 8, 2012, http://news.yahoo.com/u-militarys-secret-weapon-going-green-181348275.html.

[84] Rep. Addison Graves "Joe" Wilson, Sr. (South Carolina's 2nd District, U.S. House of Representatives) in discussion with the author, January 2013.

[85] "Association of South Carolina Energy Managers (ASCEM)" *South Carolina Energy Office*, accessed April 24, 2013, http://www.energy.sc.gov/index.aspx?m=14&t=73.

[86] "Trey Gowdy on Energy & Oil," On The Issues, accessed April 24, 2013, http://www.ontheissues.org/house/Trey_Gowdy_Energy_+_Oil.htm.

[87] "Pennsylvania State Profile and Energy Estimates," *U.S. Energy Information Administration*, July 2012, http://www.eia.gov/state/?sid=PA.

[88] "The Pennsylvania Green Jobs Survey Report," The Pennsylvania Department of Labor & Industry, December 2010, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CEEQFjAC&url=http%3A%2F%2Fwww.portal.state.pa.us%2Fportal%2Fserver.pt%2Fdocument%2F1036597%2Fpagreenjobssurveyrpt_pdf&ei=o4ZsUejxN6OriQLU_4H4Dw&usg=AFQjCNEZTcfe1_RVpl70g6binxnSnaCnkg&sig2=MrKlB4Qy-74QeuNTx9Pxkg.

[89] "Average number of employees at underground and surface mines by state and mine production range, 2011," U.S. Energy Information Administration, November 8, 2012, http://www.eia.gov/coal/annual/pdf/table19.pdf.

[90] "Pennsylvania State Profile and Energy Estimates," *U.S. Energy Information Administration*, July 2012, http://www.eia.gov/state/?sid=PA.

[91] "PennFuture report shows utility energy savings law working wonders," PennFuture, December 20, 2011, http://www.pennfuture.org/media_pr_detail.aspx?MediaID=1388.

[92] "The Alternative Energy Investment Act of 2008," Pennsylvania energy independence strategy, accessed April 24, 2013, http://www.lehigh.edu/imi/docs_pitt/pdf_Pitt/M0Cf_Guttman.pdf.

[93] "Governor Corbett Speaks to Keystone Energy Efficiency Alliance about Efficiency; Cost Savings in Pennsylvania," Pennsylvania Office of the Governor, September 24, 2012, http://www.prnewswire.com/news-releases/governor-corbett-speaks-to-keystone-energy-efficiency-alliance-about-efficiency-cost-savings-in-pennsylvania-171031981.html.

[94] Tony Nauroth, "Lehigh Valley's first solar farm sheds light on alternative energy in Upper Nazareth Township," *Lehigh Valley Live*, May 31, 2009, http://www.lehighvalleylive.com/nazareth/index.ssf/2009/05/lehigh_valleys_first_solar_far.html.

[95] Thomas Frank, "Green schools: Long on promise, short on delivery," *USA Today*, December 11, 2012, http://www.usatoday.com/story/news/nation/2012/12/10/green-schools-construction-leed/1753823/.

[96] "Connecticut's Comprehensive Energy Strategy," Dannel P. Malloy, Governor of Connecticut, October 5, 2012, http://www.ct.gov/malloy/cwp/view.asp?A=11&Q=512054.

[97] "For 2011, CT has 2nd highest electricity rates," Hartford Business Journal, June 1, 2012, http://www.hartfordbusiness.com/article/20120307/NEWS01/303079983/for-2011-ct-has-2nd-highest-electricity-rates.

[98] "Comprehensive Energy Strategy Section 51 – Comprehensive Energy Planning," Connecticut Department of Energy & Environmental Protection, last updated February 19, 2013, http://www.ct.gov/deep/cwp/view.asp?a=4405&q=500752&deepNav_GID=2121%20.

[99] The avoided cost is the actual cost of municipal energy for 2010 versus the difference in 2011 kBtus times the rates in effect in 2011.

[100] "Energy efficiency: A compelling global resource," *McKinsey Sustainability &Resource Productivity*, 2010, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CDAQFjAA&url=http%3A%2F%2Fwww.mckinsey.com%2F~%2Fmedia%2Fmckinsey%2Fdotcom%2Fclient_service%2FSustainability%2FPDFs%2FA_Compelling_Global_Resource.ashx&ei=AvFqUbj6NsH2igKRqYHYCQ&usg=AFQjCNGls_w_SA86J7z1-QPAO68ftiYt8g&sig2=5bjBUautpUMmruzfZskFzQ&bvm=bv.45175338,d.cGE.

[101] "Innovative Gas-Filled Panel Insulation from Fi-Foil," GreenSpec, July 8, 2010, http://greenspec.buildinggreen.com/blogs/innovative-gas-filled-panel-insulation-fi-foil.

[102] "Get the Light, Beat the Heat," Lawrence Berkeley National Laboratory, September 6, 2011, http://newscenter.lbl.gov/news-releases/2011/09/06/infrared-windows-coating/.

[103] Amory B. Lovins, *Reinventing Fire: Bold Business Solutions for the New Energy Era* (White River Junction, VT: Rocky Mountain Institute, 2011).

[104] Bloom Energy, accessed April 24, 2013, http://www.bloomenergy.com/.

[105] "Alternative Energy: The Bloom Box," *60 Minutes*, August 29, 2010 http://www.cbsnews.com/video/watch/?id=6816773n.

[106] "2012 Global Clean Energy Investment Falls to $268B," *GreentechMedia*, January 14, 2013, http://www.greentechmedia.com/articles/read/2012-global-clean-energy-investment-falls-to-268b.

[107] "Energy Management Reports," *Office of the Deputy Under Secretary of Defense Installations and Environment*, 2011, http://www.acq.osd.mil/ie/energy/energymgmt_report/main.shtml.

[108] "DoD Can Lead the Way on Energy Security," The Pew Charitable Trusts, May 25, 2012, http://www.pewenvironment.org/news-room/opinions/dod-can-lead-the-way-on-energy-security-85899391503.

[109] "Top U.S. General in Western Iraq Requests Renewable Energy Systems," Inside Defense NewsStand, accessed April 24, 2013, http://defensenewsstand.com/NewsStand-General/The-INSIDER-Free-Article/top-us-general-in-western-iraq-requests-renewable-energy-systems/menu-id-720.html.

[110] "Renewable Energy Systems Wanted in Iraq," Military.com, August 11, 2006, http://www.military.com/Content/Printer_Friendly_Version/1,11491,,00.html?passfile=&page_url=%2Ffeatures%2F0%2C15240%2C109512%2C00.html&passdirectory_file=%2Fnewsfiles%2F109512.htm.

[111] "Army and Marines Go Fossil Fuel-Free," Army and Marines Go Fossil Fuel-Free, May 24, 2011, http://www.worldwatersolar.com/company-news/army-and-marines-go-fossil-fuel-free/.

[112] Brian Smith (Former Officer, U.S. Air Force & former chair, Arlington County, Va., Young Republicans) in discussion with the author, January 2013.

[113] Mark Townsend and Paul Harris, "Now the Pentagon tells Bush: climate change will destroy us," *The Guardian*, February 21, 2004, http://www.guardian.co.uk/environment/2004/feb/22/usnews.theobserver.

[114] "DoD's Energy Efficiency and Renewable Energy Initiatives Fact Sheet," Environmental and Energy Study Institute, July 2011, http://files.eesi.org/dod_eere_factsheet_072711.pdf.

[115] Nathan Hodge, "Stimulus to Pay for 'Greening' of the Military," *Wired*, February 17, 2009, http://www.wired.com/dangerroom/2009/02/stimulus-packag/.

[116] "U.S. military's green projects to save $1.6 billion over time", *USA Today*, April 12, 2010, http://usatoday30.usatoday.com/news/military/2010-04-11-military-going-green_N.htm.

[117] "'NetZero' aims to cut greenhouse gases on bases," *Army Times*, March 29, 2013, http://www.armytimes.com/article/20110712/NEWS/107120321/-8216-NetZero-aims-cut-greenhouse-gases-bases

[118] "The U.S. Military's Secret Weapon: Going Green," *Yahoo! News*, August 8, 2012, http://news.yahoo.com/u-militarys-secret-weapon-going-green-181348275.html.

[119] "Energy Management Reports," *Office of the Deputy Under Secretary of Defense Installations and Environment*, 2011, http://www.acq.osd.mil/ie/energy/energymgmt_report/main.shtml.

[120] Michael Callahan, Kate Anderson, Sam Booth, Jessica Katz, and Tim Tetreault, "Lessons Learned from Net Zero Energy Assessments and Renewable Energy Projects at Military Installations," *National Renewable Energy Laboratory*, September 2011, http://www.nrel.gov/docs/fy11osti/51598.pdf.

[121] "About ESTCP," SERDP ESTCP, accessed April 24, 2013, http://www.serdp.org/About-SERDP-and-ESTCP/About-ESTCP.

[122] "Levelized Cost of New Generation Resources in the Annual Energy Outlook 2012," U.S. Energy Information Administration, July 12, 2012, http://www.eia.gov/forecasts/aeo/electricity_generation.cfm.

[123] Ibid.

[124] "SECNAV Outlines Five 'Ambitious' Energy Goals," America's Navy, October 16, 2009, http://www.navy.mil/submit/display.asp?story_id=49044.

[125] "Remarks by the Honorable Ray Mabus Secretary of the Navy, Naval Energy Forum," America's Navy, October 14, 2009, http://www.navy.mil/navydata/people/secnav/Mabus/Speech/SECNAV%20Energy%20Forum%2014%20Oct%2009%20Rel1.pdf.

[126] "Facility Type: K-12 Schools," ENERGY STAR, November 2006, https://www.energystar.gov/index.cfm?c=business.EPA_BUM_CH10_Schools.

[127] "Report: Half trillion dollars needed to update U.S. schools," USA Today, March 12, 2013, http://www.usatoday.com/story/news/nation/2013/03/12/school-maintenance-education/1981703/.

[128] "National Center for Education Statistics," Institute of Education Sciences, accessed April 24, 2013, http://nces.ed.gov/fastfacts/display.asp?id=372.

[129] "Richardsville Elementary slated to be first Net Zero School in the Nation," *Warren County Schools*, 2010, http://www.warrencountyschools.org/userfiles/1374/Net%20Zero%20news%20release.pdf.

[130] "Green schools save money," The Center for Green Schools, accessed April 24, 2013, http://www.centerforgreenschools.org/cost-savings.aspx.

[131] "Green Schools Menu of Options for State Legislator," U.S. Green Building Council, accessed April 24, 2013, https://docs.google.com/viewer?a=v&q=cache:lZx77P3KZScJ:www.centerforgreenschools.org/Libraries/Resources_Documents/US-GBC_Green_Schools_Menu_of_Options_for_State_Legislators.sflb.ashx+&hl=en&gl=us&pid=bl&srcid=ADGEESgJabgqpChgzkUpHQvewjhdYeadOP0PQ5gxxdqvze_HGz_-xsTYwk6HUFRg5ssyu7g61nahxwPe4pghOxZmsiNFuZT8GsWs-NPsiUUFpHPqm6UqrVK9AFqLgOu8wsi2h42kciFUQ&sig=AHIEtbSXOpHjtPgCsMW6rCaLrnNWboE-kQ.

[132] "The Courage to Lead: Passing Green Schools Policies to Accelerate Change," The American Institute of Architects, accessed April 24, 2013, http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aiab093467.pdf.

[133] Douglas Brinkley, *The Wilderness Warrior: Theodore Roosevelt and the Crusade for America* (New York: HarperCollins, 2009).

[134] "Ronald Reagan," Climate Conservative, accessed April 24, 2013, http://www.climateconservative.org/RonaldReagan.html.

[135] Elisabeth Bumiller and Adam Nagourney, "Bush: 'America is addicted to oil'," *The New York Times*, February 1, 2006, http://www.nytimes.com/2006/02/01/world/americas/01iht-state.html?pagewanted=all&_r=0.

[136] Nick Juliano, "Leaders of New Bipartisan Caucus 'Decided To Live Dangerously'," *E&E*, December 6, 2912, http://www.nwra.org/content/articles/leaders-of-new-bipartisan-caucus-decided-to-live-d/.

[137] "H.R. 6582 (112th): American Energy Manufacturing Technical Corrections Act," Govtrack.us, accessed April 24, 2013, http://www.govtrack.us/congress/bills/112/hr6582/text.

[138] "Obama Signs Energy Efficiency Legislation," *Greentech Media*, December 19, 2012, http://www.greentechmedia.com/articles/read/obama-signs-energy-efficiency-legislation.

[139] Andrew Restuccia, "Jeanne Shaheen, Rob Portman have high hopes for energy efficiency bill," Politico, April 18, 2013, http://www.politico.com/story/2013/04/jeanne-shaheen-rob-portman-energy-efficiency-bill-90254.html.

[140] Tyler Cowen, *The Great Stagnation: How America Ate All The Low-hanging Fruit of Modern History, Got Sick, and Will (Eventually) Feel Better* (New York: Penguin, 2005).

[141] John "Skip" Laitner (Senior Fellow, American Council for an Energy-Efficient Economy) in discussion with the author, January 2013.

[142] "Unlocking energy efficiency in the US economy," *McKinsey&Company*, July 2009, http://www.mckinsey.com/client_service/electric_power_and_natural_gas/latest_thinking/unlocking_energy_efficiency_in_the_us_economy.

[143] Robert U. Ayres and Edward H. Ayres, *Crossing the Energy Divide: Moving from Fossil Fuel Dependence to a Clean-Energy Future* (New Jersey: Pearson, 2010).

[144] "Deutsche Bank and The Rockefeller Foundation Release Building Energy Retrofit Study," Rockefeller Foundation, March 1, 2012, http://www.rockefellerfoundation.org/news/press-releases/deutsche-bank-rockefeller-foundation.

[145] Celia Baker, "Deferred maintenance and obsolete features plague U.S. schools," *Deseret News*, March 25, 2013, http://www.deseretnews.com/article/865576609/Deferred-maintenance-and-obsolete-features-plague-US-schools.html?pg=all.

[146] "ENERGY STAR for Congregations," ENERGY STAR, accessed April 24, 2013, http://www.energystar.gov/index.cfm?c=small_business.sb_congregations.

[147] "South Can Cut Utility Bills, Create Jobs and Conserve Billions Of Gallons Of Water," Georgia Tech, April 12, 2010, http://www.gatech.edu/newsroom/release.html?nid=55336.

[148] "U.S. Department of Energy's Wind Program—Lasting Impressions," U.S. Department of Energy, September 2012, http://www1.eere.energy.gov/wind/pdfs/wind_accomplishments.pdf.

[149] "Renewable Electricity Future Study," National Renewable Energy Laboratory, 2012, http://www.nrel.gov/analysis/re_futures/.

[150] Roberta Combs (President, Christian Coalition) in discussion with the author, January 2013.

[151] Richard Zilmer (Lt. General, U.S. Marine Corps) in discussion with the author, January 2013.