Union of Concerned Scientists

Catalyst

FALL 2012

END OF THE ROAD for Wind Power?

Congress could put brakes on clean energy

Also: Forest-Friendly Choices • How LED Lightbulbs Work

Union of Concerned Scientists

Catalyst,
ISSN 1539-3410, is published three times a year by the Union of Concerned Scientists. Text of articles from *Catalyst*, duly acknowledged, may be reprinted free of charge. Artwork may not be reproduced.

SENIOR EDITOR
Bryan Wadsworth

ASSISTANT EDITOR
Heather Tuttle

DESIGN
David Gerratt
NonprofitDesign.com

COVER PHOTO
© John Rogers

Catalyst is printed on chlorine-free recycled paper with 100% post-consumer content.

The Union of Concerned Scientists is the leading science-based nonprofit working for a healthy environment and a safer world.

This publication is financed by contributions from individual members; you can join UCS by sending a tax-deductible contribution of $25 or more to UCS Development, Two Brattle Square, Cambridge, MA 02138-3780.

CHAIR
James J. McCarthy

PRESIDENT
Kevin Knobloch

NATIONAL HEADQUARTERS
Two Brattle Square
Cambridge, MA 02138-3780
(617) 547-5552

WASHINGTON, DC, OFFICE
1825 K St. NW, Ste. 800
Washington, DC 20006-1232
(202) 223-6133

WEST COAST OFFICE
2397 Shattuck Ave., Ste. 203
Berkeley, CA 94704-1567
(510) 843-1872

MIDWEST OFFICE
One N. LaSalle St., Ste. 1904
Chicago, IL 60602-4064
(312) 578-1750

E-MAIL
ucs@ucsusa.org

WEB
www.ucsusa.org

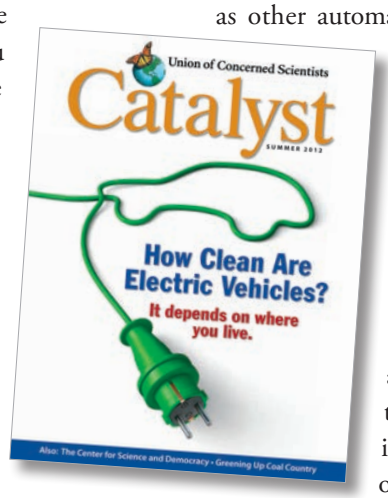
LETTERS

Please e-mail your questions or comments to catalyst@ucsusa.org. *Your submission implies permission to publish your letter and name in* Catalyst. *We reserve the right to edit letters for length.*

Electric Vehicles Spark Readers' Curiosity

In the spring *Catalyst* article on electric and hybrid cars ["How Clean Are Electric Vehicles?," p. 7], you fail to mention Tesla. The Model S is expensive, true, but its top-of-the-line model goes 300 miles (at 55 mph) on a single charge. If I want to go to San Francisco (120 miles round-trip), I cannot get there and back [on one charge] in a Nissan Leaf. The Chevrolet Volt doesn't work, either. Once the battery is exhausted, the Volt gets about 30 mpg [miles per gallon], so the round trip in my Prius (close to 50 mpg) uses less gas.

E. Blake Peterson
Santa Rosa, CA



I enjoyed reading your analysis of the relative carbon emissions of EVs [electric vehicles] due to upstream power plant emissions based on geography. Your article ["How Clean Are Electric Vehicles?"] states it used a "well-to-wheels" approach; was this true for gasoline as well?

Greg Hanssen
Irvine, CA

The author responds:

Though we focused on GM and Nissan, they are not the only automakers offering EVs. Tesla has long been a leader in the market; though it is known for its $100,000 sports car, it recently introduced the Model S sedan, which comes with multiple driving range options and starts at "only" $57,400. Tesla's EVs don't yet accommodate the average driver's budget, but its engineering and technology development have helped advance the market as a whole. For example, the only all-electric SUV currently on the market, Toyota's RAV4 EV, is propelled by a Tesla powertrain. Consumers can expect longer driving ranges and even more EV options to choose from in the years ahead, as other automakers (including BMW, Ford, Honda, and Toyota) introduce their plug-in hybrid and all-electric models.

With regard to the "well-to-wheels" approach we used in our analysis, we did indeed measure "upstream" emissions (i.e., those associated with fuel production) for both EVs and gasoline vehicles. For EVs, these include the global warming emissions from mining or extracting the fuel used to generate electricity (e.g., coal, natural gas), transporting that fuel to the power plant, and burning it in the plant. All of an EV's emissions are considered upstream since the vehicle produces no tailpipe emissions. Gasoline's upstream emissions come from the extraction, transportation, and refining of oil, and account for about 20 percent of a vehicle's overall emissions; the remaining 80 percent is generated by the burning of the gasoline in the vehicle.

Consumers can expect longer driving ranges and even more EV options to choose from in the years ahead.

Don Anair, senior engineer,
UCS Clean Vehicles Program

Back issues of *Catalyst* are available in PDF form on the UCS website at *www.ucsusa.org/publications/catalyst.*

PERSPECTIVE

Standing Up to Anti-Science Bullies

When scientists make new discoveries, we all benefit from knowing what they have learned. But if a discovery threatens vested economic interests—as when scientists find that a product or by-product harms human health—corporations and related stakeholders often choose to attack the credibility of the scientists or their research rather than respond responsibly to the findings. Over the years, asbestos and pesticide manufacturers and the lead and tobacco industries have all taken this approach.

More recently, some in the fossil fuel industry have attacked researchers whose work shows that burning oil and gas overloads the atmosphere with heat-trapping carbon dioxide and dangerously alters our climate. As the harmful consequences of global warming become ever clearer—like this summer's heat waves, droughts, and forest fires—the harassment and criticism of scientists grow increasingly extreme.

We feel confident that this dark hour in public policy debate presages a dawn of positive change.

The American Tradition Institute (ATI), for instance, has demanded private e-mail correspondence from climate scientists at public universities under state freedom of information laws. While these laws were designed to allow citizens to watchdog government agencies and officials, ATI is using them presumably to find material it can misrepresent or take out of context to sow confusion and doubt about global warming. Taking these cynical strategies one step further, the Heartland Institute sponsored billboards comparing people who accept climate science to "Unabomber" Ted Kaczynski, while a Competitive Enterprise Institute representative compared a Penn State climate scientist to former football coach and convicted child molester Jerry Sandusky.

In the face of these attacks, it's more important than ever for scientists to fight back, and UCS is making sure their voices can be heard above the din of denial. We have helped scientists and universities fight intrusive open-records requests, condemned the use of inflammatory rhetoric, and released a booklet that offers scientists guidance on dealing with harassment (see "Newsroom," p. 6). We have also put pressure on Pfizer—which has professed a commitment to addressing climate change—to join the 20 companies that have withdrawn funding from the Heartland Institute in response to its anti-science ads.

We feel confident that this dark hour in public policy debate presages a dawn of positive change, and that the public will increasingly recognize and reject these disturbing and extreme attempts to delay meaningful action. By supporting scientists under attack, we can help ensure their science contributes to decisions that improve our health and environment.

—***Kevin Knobloch**, president*

10

CONTENTS

FEATURES

DEPARTMENTS

Photos: © Richard Howard (Kevin Knobloch); © Rhett Butler/mongabay.com (forest)

UCS Midwest Office Director Steven Frenkel speaks to reporters about *Heat in the Heartland* at the Crown Fountain at Millenium Park.

More Long Hot Summers Ahead?

UCS documents decades of warming in the Midwest

"Hot enough to fry an egg on the sidewalk" may be a cliché, but Keith Schmitz, a cook at Mickey's Diner in Minneapolis, proved it true in front of his restaurant last Independence Day, when the temperature hit a record-breaking 101°F. But the country's brutal summer heat was no joking matter: 22 people died from heat-related illness during a June heat wave in the Northeast, and by July 9, heat had claimed 82 lives across the United States.

Midwesterners are living with more hot and humid summer days, more heat waves, and fewer cool days that bring relief from the heat.

As temperatures rise, public health officials face a difficult challenge. In *Heat in the Heartland: 60 Years of Warming in the Midwest*, the latest report in our "Climate Change and Your Health" series, UCS analyzed six decades of summer weather data for five major urban areas (Chicago, Cincinnati, Detroit, Minneapolis, and St. Louis). The findings show that many Midwesterners are living with more hot and humid summer days (and nights), more heat waves, and fewer cool days that bring relief from the heat.

Older Midwesterners; children; people with cardiac, pulmonary, and kidney diseases; and urban residents are particularly vulnerable to the health risks associated with dangerously hot weather. And as previous UCS reports have emphasized, unchecked global warming could greatly increase the incidence of heat-related illness and death.

It was over 90°F when the report's authors arrived in Chicago on July 25 to release their findings. Over the next three days, they traveled across the Midwest to meet with reporters, Senate staff, city and state public health and planning departments, newspaper editorial boards, and local groups working on climate change and environmental justice. The authors also led a delegation of medical and public health experts to Washington, DC, in August to speak with officials at the White House Council on Environmental Quality.

Our report received coverage in each of the featured cities' major newspapers (including the *Chicago Sun-Times* and the *Detroit Free Press*), as well as on local television, public radio, and the *NBC Nightly News*. We are also working with another organization to have the report used in the Chicago public schools. Now that we have people's attention, we can bring more pressure to bear on the local and state officials who can implement policies that protect residents from extreme heat and other impacts of global warming.

Monsanto Fails at Healthy Farming

We use science to counter corporate spin

The Monsanto Company, the largest seed company in the world, has spent millions of dollars in advertising to portray itself as an innovator in sustainable agriculture, but the truth is decidedly less impressive. This past summer, as Congress debated the farm bill, UCS ran its own set of ads in Washington, DC, to set the record straight. One ad counters Monsanto's claim that its

Photo: © Nathaniel Berger

seeds can feed the world "while protecting the earth's natural resources" by showing that the company's Roundup Ready crops (which have been genetically engineered to survive being sprayed with the company's Roundup herbicide) have *increased* herbicide use by an estimated 383 million pounds, spawned an epidemic of herbicide-resistant "superweeds," and decimated monarch butterfly egg-laying habitat. Other ads refute Monsanto's claims that its genetically engineered crops produce significantly higher yields and save water.

One of our ads in a Washington, DC, subway station

Monsanto's marketing muscle has crowded out better alternatives, but you can help turn that around. Join the more than 35,000 UCS members and activists who have shared our ads via e-mail, Facebook, and Twitter, and tell policy makers that farmers and consumers deserve truly sustainable agriculture based on science, not spin. See the ads and spread the word at *www.MonsantoFails.org*.

Independent Scientists *Are* Out There

UCS proves Congress wrong

The U.S. Food and Drug Administration's (FDA's) scientific advisory committees provide advice to the agency on the safety and efficacy of a wide range of products, from drugs and vaccines to tobacco products and medical devices. Yet recently, more than 100 drug and medical device advisory committee positions (out of 620 total) sat vacant. Some in Congress claimed that it was too difficult to find independent experts to fill them. Influenced by $700 million in industry lobbying, Congress relaxed conflict-of-interest rules for these committees last summer, making it easier for experts with financial ties to the manufacturers to wield undue influence over the approval process.

We knew the government was not looking hard enough—there are thousands of qualified experts in the United States. So with some e-mails to our online Scientist Network, we were able to find enough qualified, independent experts to fill *more than half* the vacant positions. We helped the scientists prepare their applications and formally nominated 61 to serve on 19 separate FDA committees.

Congress, influenced by $700 million in industry lobbying, relaxed conflict-of-interest rules for FDA scientific advisory committees.

UCS continues to encourage scientists with no conflicts of interest to apply for committee vacancies or replace existing advisors as they step down. For more information on how to serve, contact us at *sciencenetwork@ucsusa.org*.

Are You *Cooler Smarter* Than Your Friends?

Test your climate knowledge with our new game

If you're looking for a fun way to engage your friends and neighbors in combatting climate change, try hosting a *Cooler Smarter* trivia night. We have created a kit (based on our *Boston Globe* best-selling book about reducing global warming emissions in our daily lives) that provides all the tools you need to host a successful and inspiring event.

The *Cooler Smarter* Trivia Kit includes a sample agenda for the evening, five rounds of questions and answers that draw from the book's findings, and event-planning tips. For example: at the end of the evening, have your guests visit *www.CoolerSmarter.org* and use our "20 days, 20 ways, 20% less carbon" interactive tool to learn even more helpful strategies for shrinking their carbon footprint.

See why we're excited about this creative approach to low-carbon living by downloading the Trivia Kit—or reading more about the book—at *www.ucsusa.org/coolersmarter.*

Photo: © Karen Perry Stillerman

Hope for Clean Energy in California

UCS tracks public utilities' progress

California leads the nation in clean energy policy: its 2011 Renewables Portfolio Standard (RPS) broke new ground by requiring all utilities to obtain 33 percent of their electricity sales from clean resources by 2020. Since publicly owned utilities (POUs)—which supply about a quarter of the state's electricity—had been exempt from an earlier RPS, some wondered whether they could meet the new requirement.

A solar photovoltaic array in Hopland, CA

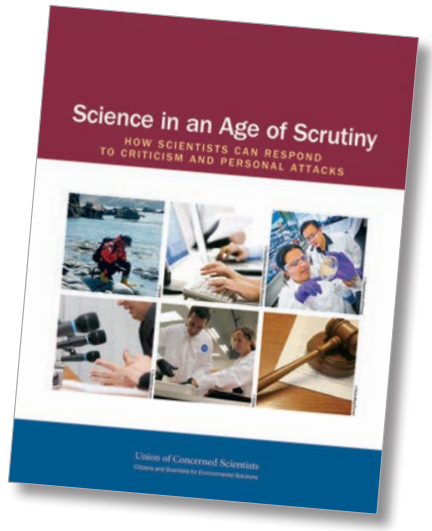
Our July report *The Clean Energy Race: How Do California's Public Utilities Measure Up?* allayed these concerns by showing that the state's 10 largest POUs have already made significant voluntary investments in renewable energy. Under the state's original RPS (which called for 20 percent renewable electricity by 2010), the POUs expanded their portfolios from 4 percent to nearly 19 percent by the end of 2010. However, the degree to which these investments promoted the development of new clean energy resources varied significantly among utilities. Some, for example, relied on short-term contracts with existing facilities in lieu of signing long-term contracts that provide the financial security that new projects need and would actually increase clean energy production.

The Clean Energy Race is the first report to present data on POUs' energy investments in a standardized and accessible way, and has proven a valuable tool for local clean energy advocates and developers looking to compare utilities. We have also used this analysis to influence the development of new rules for POUs under the RPS, ensuring the standard produces the maximum environmental and economic benefits. These rules could be applied to similar standards around the country. To learn more, visit *www.ucsusa.org/cleanenergyrace*.

UCS Empowers Scientists to Fight Back

With new tool for responding to public attacks

As scientific research uncovers new facts about global warming and other environmental and health problems, special interests often attempt to avoid regulation by publicly attacking the scientists who produced the research. These attacks can come in the form of harassing e-mails, denouncements from politicians, invasive open-records requests, and even personal threats. Thrust into the spotlight by this negative attention, scientists can become an even bigger target depending on how they respond.



Thrust into the spotlight by negative attention, scientists can become even bigger targets depending on how they respond.

UCS has developed a booklet titled *Science in an Age of Scrutiny* to help scientists whose research is at the center of public policy discussions decide how to handle various types of attacks *before* they occur, while effectively communicating their research results with policy makers and the public. To that end, we suggest how scientists should distinguish legitimate inquiries from harassment. Knowing whether, when, and where to fight back—and to whom they might turn for help—enables scientists to prepare a compelling response while avoiding critical mistakes. Download the guide at *www.ucsusa.org/scientistsunderscrutiny.*

Photo: © Charles Benton

Will Congress Take the WIND Out of Our Sails?

Renewable energy has been a bright spot in the U.S. economy, but not everyone is cheering its success. UCS intends to keep wind power on a favorable course.

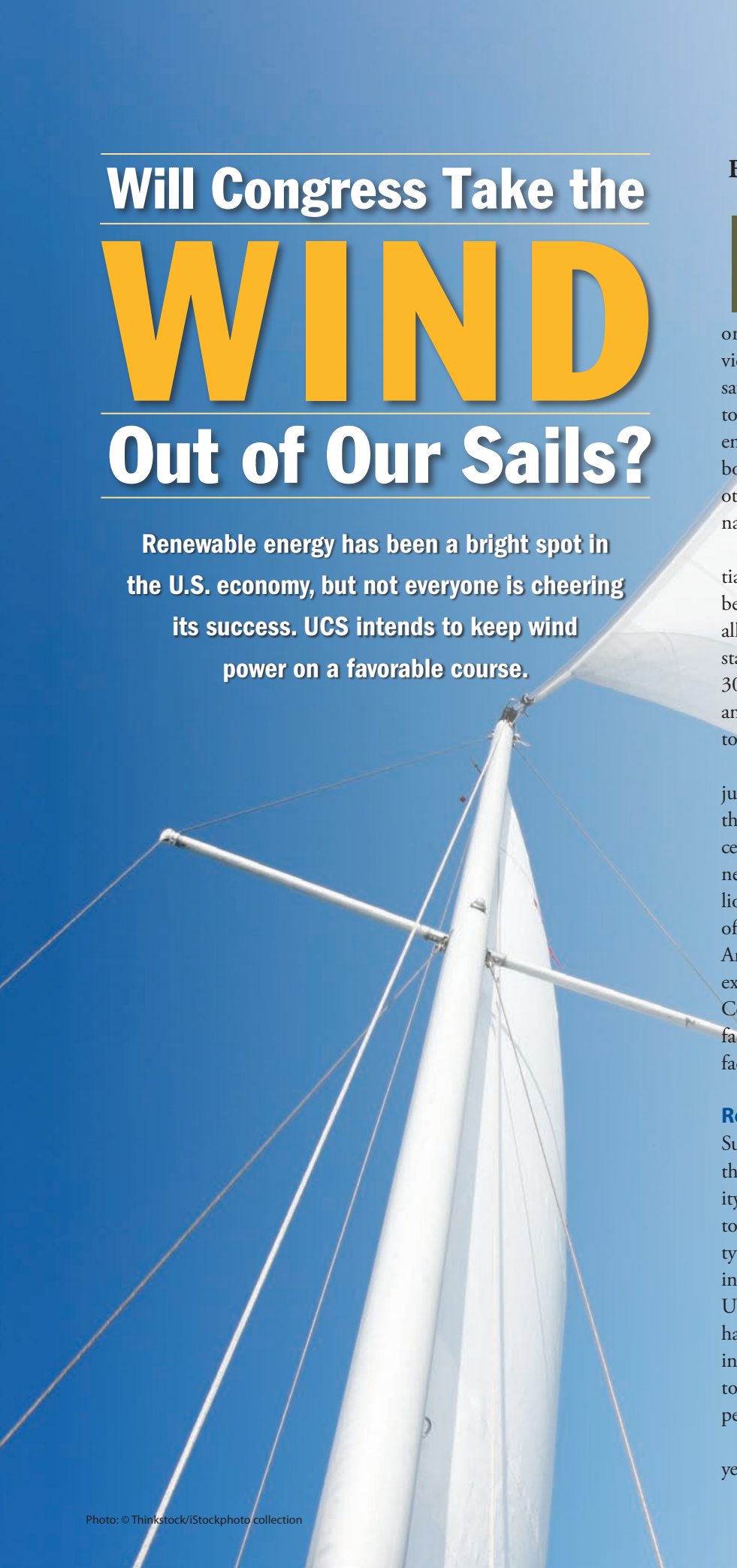


Photo: © Thinkstock/iStockphoto collection

By Elliott Negin and Steve Clemmer

In 2004, Colorado voters approved a referendum for a new renewable electricity standard (RES) requiring local utilities to obtain 10 percent of their power from the wind, sun, or other clean energy sources by 2015. That victory occurred largely because UCS and others saw its passage as a precedent-setting opportunity to demonstrate growing public support for clean energy; we believed success in Colorado would boost the chances for passing similar initiatives in other states and increase congressional support for national clean energy policy.

UCS mobilized support for the Colorado initiative, evaluating and publicizing the standard's benefits. And after its adoption, we worked with allies in the state to push legislators to raise the standard twice more. Today, the state's target is 30 percent by 2020, and the standard has proven an unqualified success—especially when it comes to wind.

When the referendum passed, wind provided just 0.5 percent of the state's total electricity; by the end of 2011, it provided more than 9 percent—1,805 megawatts (MW), or enough to power nearly 500,000 typical homes and keep 3.5 million tons of heat-trapping carbon emissions out of the atmosphere each year, according to the American Wind Energy Association. Wind energy expansion generated as many as 5,000 jobs in Colorado and attracted leading equipment manufacturers such as Vestas, which now has three facilities in the state employing 1,600 people.

Renewables Buck the Recession

Success stories like Colorado's are happening across the country. Over the past five years, wind capacity has tripled to more than 50,000 MW—enough to power nearly 13 million homes and retire 44 typical coal-fired power plants. Particularly exciting is the fact that since 2005, the percentage of U.S.-manufactured components for wind turbines has jumped from 35 percent to 67 percent, keeping some 500 factories in 44 states humming. All told, the U.S. wind industry employed 75,000 people as of late 2011.

The U.S. solar industry is growing as well. Last year, it installed a record 1,855 MW of photovoltaic

Fossil fuels and nuclear power have received billions of dollars in subsidies for decades, while renewables have received only a fraction of this total.

panels—more than twice the total of the previous year, according to the Solar Energy Industries Association—and that torrid pace continued in the first half of 2012. The United States now has 5,700 MW of installed solar capacity, enough to power more than 940,000 households, and the solar workforce has more than doubled since 2009 to more than 100,000 people at more than 5,600 businesses across the country.

Technological advances have helped facilitate renewable energy's spectacular expansion in the midst of the Great Recession, but the main driver has been clean energy policy. State renewable electricity standards have provided a long-term market for development, and federal tax credits have allowed renewable energy to better compete with fossil fuels and nuclear power. Yet despite this remarkable success, the future of renewables, especially wind, is in jeopardy.

Over the past five years, wind capacity has generated enough electricity to power nearly 13 million homes and retire 44 typical coal-fired power plants.

Growth Stalls Ahead of a Key Deadline

Unlike many fossil fuel and nuclear power subsidies that are permanent, renewable energy incentives must be renewed every few years. The federal solar tax credit, for example, will stay in place through 2016—and there is bound to be a fight over it then—but the wind production tax credit (PTC) expires at the end of this year, and its prospects for renewal are in doubt.

The PTC is critical to the relatively young wind industry because it helps developers secure financing for new facilities

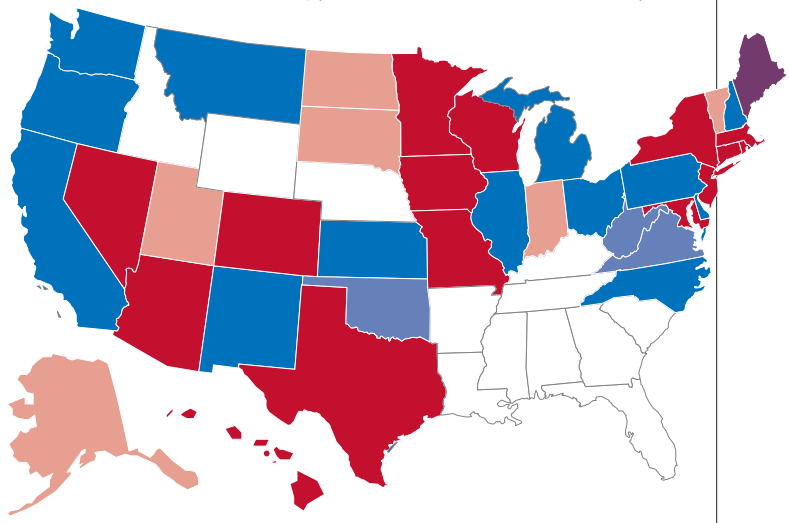
Renewable Electricity Standards under Attack

Fossil fuel interests threaten to undo years of progress.

UCS has been a leading advocate of state renewable electricity standards since the mid-1990s. Besides pioneering the policy, our experts have helped draft, strengthen, or defend nearly every standard that has been adopted over the last two decades. Currently, 29 states and the District of Columbia have enforceable standards ranging from 10 percent to 40 percent. Nine other states have voluntary renewable energy goals. As the figure shows, these standards have had strong bipartisan support across the country.

Despite their popularity, the standards are being challenged by state legislators affiliated with the American Legislative Exchange Council (ALEC), which has financial links to the Koch brothers. ALEC works with corporations including Duke Energy, Entergy, Progress Energy, and other utilities to ghostwrite legislation on a wide range of issues. So far, ALEC members have introduced bills to repeal renewable electricity standards in Colorado, Michigan, Montana, Ohio, Washington, West Virginia, and Wisconsin. UCS is working with supporters in these states to protect their standards from this coordinated attack.

Proof that Clean Energy Can Be Bipartisan Policy



This map shows the party affiliation of the governor in office at the time when a state's initial renewable electricity standard (or goal) was enacted.

and sign power purchase agreements with utilities. If Congress fails to renew the PTC, investment in wind projects could drop 65 percent, from $15.6 billion in 2012 to $5.5 billion in 2013, forcing developers to install only 2,400 MW of wind capacity in 2013—less than a quarter of what is expected this year—and lay off nearly half their workforce (some 37,000 people).

With all the uncertainty surrounding the PTC's fate, layoffs have already begun. In August, Vestas cut approximately 120 jobs in Colorado and Clipper Windpower cut 174 jobs, mostly in Iowa. A month later, Siemens Energy announced plans to lay off 615 employees—37 percent of its U.S. staff—at its wind facilities in Iowa and Kansas and its headquarters in Florida.

Misplaced Priorities

In early August, the Senate Finance Committee voted 19–5 to extend the PTC for one year; the extension had bipartisan support in the committee and is supported by Pat Roberts (R-KS) and Chuck Grassley (R-IA). A similar bill in the House has 80 co-sponsors, including 18 Republicans. The extension even has the support of organizations that have opposed federal action on climate change, including the National Association of Manufacturers and the U.S. Chamber of Commerce.

Fossil fuels and nuclear power have been feasting on federal subsidies for decades while renewables have been living on scraps.

So what's holding it up? Despite the fact that the wind industry has contributed at least $60 billion to the national economy since 2005, House leaders say they are concerned about the cost of $3 billion to $4 billion a year in tax credits. The most vocal opponents of the PTC, including several groups funded by the oil industry's billionaire brothers Charles and David Koch, argue that the government is playing favorites by granting the wind industry the tax credit. In early September, Koch-backed Americans for Prosperity and other groups sent a letter to Congress opposing the extension, arguing that it "continues the deplorable practice of using the tax code to favor certain groups over others."

Neither the House leadership nor the Koch-affiliated groups, however, question the fact that fossil fuels and nuclear power have been feasting on federal subsidies for decades while renewables have been living on scraps. For example:

- The oil and gas industry has received an average of $4.86 billion in subsidies (in today's dollars) every year for nearly 100 years—from 1918 to 2009
- The nuclear industry—which would not be economically viable without government support—received an average of $3.5 billion every year from 1947 to 1999, and continues to benefit from similar amounts of support today
- Coal received between $3.2 billion and $5.4 billion in 2008 alone, while renewables averaged only $370 million a year between 1994 and 2009

Uncertainty about the production tax credit's future has already led to thousands of layoffs in the wind industry.

Time to Level the Playing Field

The question is not whether energy production should be subsidized. The federal government clearly has a role to play in helping promising technologies compete in the marketplace. The question is whether the government should continue to underwrite extremely profitable, mature industries—especially highly polluting ones—at the expense of cleaner, more efficient, low-carbon alternatives. The obvious answer is no.

Excluding hydropower, renewable energy currently accounts for only about 5 percent of U.S. electricity, but UCS research shows it has the potential to generate more than 40 percent by 2030, with as much as half coming from wind. That would replace the share currently generated by coal, which is responsible for more than 80 percent of the U.S. electricity sector's carbon emissions.

Extending the PTC now, and enacting a national renewable electricity standard in the near future, would go a long way toward protecting us from the worst consequences of global warming and bolster the economy at the same time. Continuing with business as usual, on the other hand, would waste taxpayer dollars while threatening our health and environment for generations to come.

Elliott Negin *is director of news and commentary at UCS.*
Steve Clemmer *is director of research and analysis in the UCS Climate and Energy Program.*

Learn more about renewable energy technologies, and how UCS is helping to shape clean energy solutions, at *www.ucsusa.org/clean_energy.*

Photo: © Wind Capital Group

Like Deforestation with Your Meal?

Tropical forests are being cleared at an alarming rate to meet rising demand for meat, vegetable oil, and wood products. But UCS shows that it doesn't have to be this way.

By Sarah Roquemore

It's dinner time and you've grilled some steaks for your family to enjoy at the dining room table. After dinner you open a box of cookies for a quick treat. That meal might have included one ingredient you weren't expecting: tropical deforestation.

More and more tropical forests are being cleared to make room for industrial agriculture that produces goods like beef and vegetable oils, and timber plantations that supply wood and paper products. The resulting deforestation causes about 15 percent of global warming pollution worldwide, harms biodiversity, and hurts the millions of people who rely on these forests for their livelihoods.

Fortunately, your family dinner can have a happy ending. A series of three UCS reports recently examined the main drivers of tropical deforestation and found that businesses, governments, and consumers can all contribute to forest-friendly policies and products.

Tropical deforestation contributes to global warming, harms biodiversity, and hurts the livelihoods of forest peoples.

Out of the Frying Pan, into . . . Your Shampoo

Vegetable oil consumption is outpacing population growth because it is now used for much more than cooking. Vegetable oils are commonly found in thousands of products, ranging from processed foods like cookies to cleaning products and shampoo. (In processed foods, most oils are clearly listed on the ingredient label, but it is trickier to identify oils in cosmetics and household products because only the chemical names are typically listed: sodium laureth sulfate and stearic acid are two such ingredients that may be derived from palm oil.) Growing government mandates for vegetable oil-based biodiesel are also driving demand.

As our report *Recipes for Success*, released in February, found, palm oil is the dominant vegetable oil on the market today because its high crop yields allow large amounts to be produced at low cost. But it is the worst in terms of deforestation and

global warming emissions. The area harvested for palm oil in the tropics (primarily Indonesia and Malaysia) has doubled in just a decade, including production on peat swamps that release significant amounts of heat-trapping carbon dioxide into the atmosphere when drained of water and then burned (or left to decompose).

What's in the Meat You Eat?

Eating meat has a major effect on deforestation because producing meat—particularly beef—uses a lot of land. Land is needed both for grazing and for growing feed crops (like corn). In recent years, much of the land cleared for meat production has come from tropical forests.

Beef is ecologically inefficient: it uses about 60 percent of the world's agricultural land yet produces less than 5 percent of the world's protein and less than 2 percent of its calories.

Our June analysis, *Grade A Choice?*, uncovered the ecological inefficiency of beef production: it uses about 60 percent of the world's agricultural land yet produces less than 5 percent of the world's protein and less than 2 percent of the world's calories. And as more people around the globe view beef as the centerpiece of a meal instead of an occasional treat, this inefficiency is expected to become more pronounced.

The Knock on Wood

Everyone knows that paper and wood products come from trees—but not everyone considers the source of the trees. Although our report *Wood for Good*, released in September, found the amount of wood and paper coming into the United States from tropical trees to be small, tropical production is increasing. Perhaps most surprisingly, we found that wood pulp (used to make paper) is one of the fastest-growing wood product sectors, even in this age of e-mail and e-readers. The countries losing their forests at the fastest rate (mainly tropical countries) are also becoming more significant exporters in the global wood market.

Despite their negative connotations, timber plantations can be one of the best sources for wood products if they are well managed. But few countries or companies have policies in place to ensure their plantations do not replace natural forests, or that forests partially cleared for timber are not then completely cleared for palm oil or cattle (a common occurrence in tropical forests).

Progress on Palm Oil

Can one company's about-face on tropical deforestation inspire others?

For many years, Nestlé, the world's largest food company, used palm oil in products like its Kit Kat candy bars. But in 2010, Greenpeace launched a campaign highlighting the fact that the palm oil in Kit Kat bars is linked to the deforestation that is pushing the world's orangutan population to the brink of extinction. The thousands of responses Nestlé received pushed the company to create a comprehensive zero-deforestation policy for all its ingredients—even the paper used in its packaging—and has been making strong progress in implementing these requirements for its global supply chains.

Not all companies have reacted as decisively. Since 2007, two Girl Scouts, Madison Vorva and Rhiannon Tomtishen, have been fighting to make Girl Scout cookies deforestation-free. In 2010 UCS joined forces with the girls to raise awareness of palm oil's impacts. Yet, after meetings and phone calls with executives of the organization, and more than 80,000 letters from activists worldwide (including UCS members), Girl Scouts USA has yet to source deforestation-free palm oil in its cookies. To learn more and join this campaign, visit *www.ucsusa.org/girlscouts*.

Orangutans will continue to lose their natural habitat unless more companies follow the example set by Nestlé in limiting its use of palm oil.

Photo: © Flickr/David Wynia

A Forest-Friendly Future

Together, we can reverse these trends and ensure that the products we use and the foods we eat are not contributing to tropical deforestation. There are a variety of ways consumers like you can make a difference:

Reduce demand. Cutting back on the amount of palm-oil-, beef-, and wood-based products we use can help take pressure off of forests. Choosing the lowest-impact option when buying these products can also help; for example, consider swapping beef for pork or chicken, which require three to five times less land. In addition, use paper with the highest recycled content possible—and recycle it afterward—and buy things in bulk to reduce packaging.

Support deforestation-free products. Businesses that use products or ingredients that drive tropical deforestation should assess their practices and ensure their supply chains are forest-friendly. Many times, however, securing these changes requires pressure from an outside force. Consumers can play a large role by supporting businesses that have policies that protect forests (e.g., only sourcing palm oil produced on non-forested land) and pressuring companies that do not. These efforts can be very effective: for example, a strong outcry from the Brazilian people led the nation's soybean industry to place a voluntary moratorium on expanding its Amazon harvest in 2006, which has helped Brazil reduce its deforestation rates by more than 80 percent. (See the sidebar for additional examples.)

Our suite of reports details how businesses, governments, and consumers can all contribute to forest-friendly policies and products.

Support good government policies. Governments should establish strong agricultural policies that discourage development in or near forests, and avoid loopholes or subsidies for commodities that drive deforestation. Equally important is ensuring the enforcement of good laws; the United States' Lacey Act bans the trade of illegally sourced plant products, including wood, but is under attack by anti-regulation groups. Tell your elected leaders that you support laws and regulations that encourage deforestation-free development.

No single action offers a complete solution. Every link in the supply chain—from loggers to producers to retailers to consumers—must help ensure that we can meet future demand for vegetable oils, meat, and wood products while protecting the planet's tropical forests.

Sarah Roquemore *is outreach coordinator for the UCS Tropical Forest & Climate Initiative.*

Consumers can support businesses that have policies that protect forests and pressure companies that do not.

UCS has a wealth of resources on the drivers of—and solutions to—tropical deforestation. Download our recent reports at *www.ucsusa.org/forests.*

Forest-Friendly Labels Are a Good Start

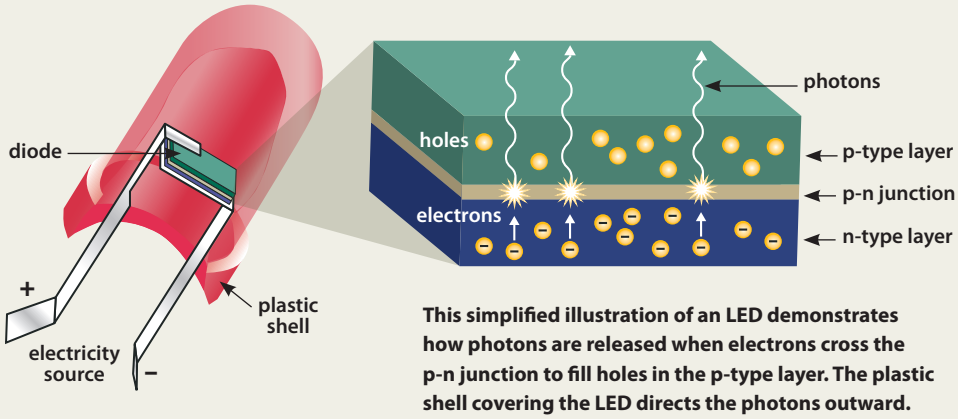
But stronger policies are needed to truly protect tropical forests.

Buying products that bear the Forest Stewardship Council (FSC) or Roundtable on Sustainable Palm Oil (RSPO) labels, which certify wood and palm oil producers, respectively, is an easy way to help protect forests and support businesses that do the same, but even these programs can be improved with higher standards. As *Catalyst* went to press, UCS was applying for membership as an official stakeholder in the RSPO, which will help us push for certification standards—based on the best available science—that make meaningful strides toward protecting forests.

UCS is also calling on companies to not just buy or sell certified products, but to go a step further and actually ensure that their supply chains are not causing tropical deforestation. Consumers can help in this regard by increasing their demand for certified goods, which encourages more companies to become certified and, in turn, addresses deforestation in supply chains.

LED Lightbulbs

LEDs (light-emitting diodes) have come a long way from their early days forming the red numbers in 1960s-era scientific calculators; today they produce nearly every color of the rainbow and are found in seemingly every gadget we encounter. But what has recently put LEDs in the spotlight is their potential to overtake incandescent and compact fluorescent lightbulbs (CFLs) as the lightbulb of choice.



This simplified illustration of an LED demonstrates how photons are released when electrons cross the p-n junction to fill holes in the p-type layer. The plastic shell covering the LED directs the photons outward.

Big Things in a Small Package

LEDs are tiny semiconductors that emit light. Each semiconductor, typically built on a base of sapphire crystal, consists of two layers of material on which chemicals have been applied (a process called doping) to facilitate an electric current. One layer has "holes" where electrons would normally go, and thus has an overall positive charge (P); the other layer has extra electrons in it and thus has a negative charge (N).

LED lightbulbs last 25,000 to 50,000 hours, compared with about 2,000 for incandescents and 8,000 for CFLs.

The surface between the "p-type" and "n-type" layers is called the p-n junction (see the diagram); electron movement at this surface produces an electric field that allows electrons to flow only from the p-type layer to the n-type layer. But when current is applied to the LED, the electrons move in the other direction and fill in the holes in the p-type layer. In the process, they release energy in the form of light (photons). Different doping chemicals are used to produce different colors.

To prevent most of these photons from being reflected back into the LED or traveling parallel to its surface (thereby diminishing their light), most LEDs are enclosed in a plastic shell, typically with a domed top and reflective base. The shell not only helps concentrate and direct the light outward, like a lens, but also protects the LED's fragile circuitry.

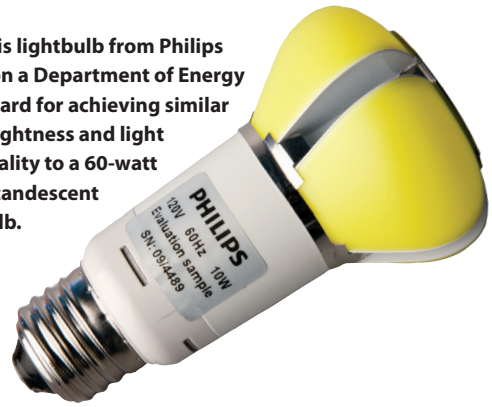
Tricks of the Trade

LEDs differ from incandescent bulbs and CFLs in a number of ways. Their bright, narrowly focused light makes them well suited for indicator lights (e.g., "new message" lights on phones) and task lighting (e.g., under-cabinet kitchen lights). For omnidirectional, diffuse light—the kind emitted by incandescents and CFLs, which is preferable in residential and office lighting—LEDs are arranged to shine in multiple directions and covered with filters to scatter and soften the light.

To recreate the "soft white" light of incandescent bulbs (which current LEDs cannot create on their own), blue LEDs are coated with a yellow phosphorescent coating. The exact composition of the coating determines the bulb's color "temperature" (i.e., "warm" white versus "cool" white).

A Bright Idea in Energy Savings

LED lightbulbs are more durable and much longer-lived than both incandescent bulbs and CFLs: LEDs last 25,000 to 50,000 hours—equivalent to at least



This lightbulb from Philips won a Department of Energy award for achieving similar brightness and light quality to a 60-watt incandescent bulb.

17 *years* if used four hours per day—compared with about 2,000 for incandescents and 8,000 for CFLs. And LEDs are much more energy-efficient than incandescents: a 12-watt LED generates the same amount of light as a 60-watt incandescent bulb. Each such incandescent bulb replaced with an LED bulb eliminates 70 kilowatt-hours (kWh) of electricity consumption each year, assuming the lights stay on four hours per day; in turn, this prevents an average of nearly 87 pounds of heat-trapping carbon dioxide—the main contributor to global warming—from being released into the atmosphere by power plants.

This efficiency translates into lower energy costs. Left on for four hours per day, a 12-watt LED lightbulb uses about $1.75 of electricity per year (assuming an average electricity rate of 10 cents per kWh), versus $8.76 for an incandescent bulb. Of course, consumers can only benefit from these savings if they can afford the high up-front cost of the bulbs themselves; at $20 or more per bulb, it can be expensive to outfit a whole house with LEDs at once. However, scientists at the University of Cambridge are attempting to create LED semiconductors using a silicon base instead of the more expensive sapphire; if successful, LED prices could be significantly lower in the near future.

While not significantly more energy-efficient than CFLs, LEDs offer several other advantages. They do not contain mercury (which may appeal to consumers who worry about mercury exposure if CFLs break or are improperly discarded), reach their full brightness without any noticeable delay, are often dimmable, and can be turned on and off frequently with no adverse impact.

Manufacturers See the Light

LEDs are making their way into many products.

Televisions. Most liquid-crystal display (LCD) televisions are backlit with white fluorescent tubes, but a growing number of models use LEDs instead. "Full-array" LED TVs (in which LEDs are arranged behind the entire display panel) can brighten or dim specific portions of the screen to make darker colors deeper and more realistic. "Edge-lit" models (which place LEDs around the edge of the screen and direct their light inward) weigh less and are much thinner.

Brake lights. In addition to their slimmer profile and longer life, LEDs can enhance vehicle safety compared with halogen and xenon bulbs: they reach full brightness up to a half-second faster, giving drivers at highway speeds as much as an extra car length of space to react.

Grow lights. Home and commercial gardeners often get a head start on the planting season by starting their seedlings under bright "grow lights." LEDs offer the same brightness but with much less heat, preventing damage to tender young leaves.

Semiconductors using a silicon base instead of sapphire could lower LED lightbulb prices significantly in the near future.

Room for Improvement

Like any technology, LEDs are not free from drawbacks. For example, as wattage increases, LEDs generate more heat but not more light, reducing their overall efficiency. And since they do not dissipate this heat in the way other lightbulbs do (incandescent bulbs get hot because they emit infrared radiation), LEDs need a heat "sink" to dissipate this heat and keep the LEDs from overheating; the heat sink often takes the form of aluminum "fins" around the bulb.

These factors slowed manufacturers' efforts to create LED bulbs that exceed the light output of 60-watt incandescents, but several that match the brightness of 75-watt incandescents are now available, and manufacturers recently unveiled the first prototype LED bulbs with light output rivaling that of a 100-watt incandescent. Continuing research promises to make LED lighting even better, cheaper, and more energy-efficient. Given how far lightbulbs have come from their humble origins to their current role in helping reduce the threat of global warming, Thomas Edison would no doubt be impressed.

Heather Tuttle *is assistant editor at UCS.*

Science Is One of This Family's Values

Early in their relationship, UCS members Randy Smith and Lori Kenschaft of Arlington, MA, made a "wonderfully freeing" decision: no matter how much their income changes each year, they give 10 percent to organizations they believe do highly effective work on issues that are important to them.

Randy and Lori share our goal of addressing the critical issues of climate change and sustainable agriculture.

Randy, an engineer at Google, and Lori, a community activist, have included UCS in their annual giving since 2002 for three reasons. First, UCS shares their goal of addressing the critical issues of climate change and sustainable agriculture. Second, they look for organizations that can change minds, and they know UCS is persuasive, having seen our scientists quoted in the news and having used our publications in their own educational work. Finally, they feel that UCS "strengthens the virtues of reason, rationality, and facts as critical to the process of solving problems."

Green Living: Good for the Soul

Randy and Lori put their values into action by pursuing change in their own community. Their success with habitat-oriented gardening (which relies on mostly native plants that feed bees and butterflies and do not need extra water) has motivated Lori to offer gardening classes and consultations and establish eco-friendly gardens in public areas around town. Lori also helped create a "green sanctuary" at her Unitarian Universalist church, which has not only made the building more energy efficient but also fostered a sense of environmental stewardship among parishioners.

Photo: © Mike Booth

We're proud to have Randy and Lori as part of our diverse and vibrant community of supporters—people who, like UCS, develop innovative solutions for a healthier environment and a safer world.

Union of Concerned Scientists

Two Brattle Square
Cambridge, MA 02138-3780

Nonprofit
Organization
US Postage
PAID
Union of
Concerned
Scientists

Member of EarthShare

USE YOUR DAILY POCKET CHANGE TO PROTECT THE PLANET

The UCS Partners for the Earth monthly giving program makes it easy for you to support our work for a healthy environment and a safer world. Just choose an amount that's comfortable for you—even a modest sum can make a difference over time—and we'll automatically charge it to your credit card or deduct it from your bank account every month.

As a Partners for the Earth member:

- You receive less mail
- Your gifts go to work faster
- You reduce our fund-raising costs
- You receive special updates on our work
- You save time, trouble, and paper—no need to write checks

Sign up now and receive a free UCS tote bag!

Yes, I want to be a *Partners for the Earth* member. Please charge or debit the amount I've checked below each month and send me my free UCS tote bag.

Amount per month: ❑ $20 ❑ $25 ❑ $35 ❑ Other $_____ *($10 minimum)*

Payment method:

❑ Bank account (I've enclosed a check for my first month's contribution. I understand that the automatic transfers will begin the following month.)

❑ MasterCard ❑ VISA ❑ Discover ❑ American Express

Account # _____ Exp. Date _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

E-mail _____

Phone _____

❑ Please don't send me the tote bag.

Send your completed form to UCS in the envelope inside this issue of *Catalyst*. If you have any questions, please contact Jennifer Campbell at (800) 666-8276 or *jcampbell@ucsusa.org*.

Our guarantee: You may stop or change your pledge at any time. **PNNXXM**