Center for American Progress

THE CENTER FOR THE NEXT GENERATION

Regional Energy, National Solutions

A Real Energy Vision for America

Edited by Kate Gordon, The Center for the Next Generation
and Kiley Kroh, Center for American Progress

October 2012

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Introduction and summary

America's energy future is at a crossroads. Everyone can agree that we must reduce our dependence on foreign oil while strengthening our economy and creating jobs. But how do we get there?

One path at first appears to be a shortcut: Exploiting our natural resources and drilling our way to an energy-independent future. But it's a deceptive path, which disregards the long-term implications for our landscapes, environment, security, and economy. The alternative is a longer but more realistic path, one that continues to diversify and strengthen the economy through proactive solutions that move us toward sustainable energy independence and create the jobs of the future.

In that first vision—brought to us in ads, policy briefs, and conferences funded by billion-dollar energy companies—America is a land of fossil-fuel extraction, where every region makes its own contribution to a drilling-intensive future.[1] Fossil fuel interests have spent an estimated $153 million in this year alone promoting fossil fuels and attacking clean energy industries,[2] but perhaps the best articulation of this "drill baby drill" vision comes from the American Petroleum Institute, the oil and gas industry's trade association. Its recent platform proposal to the Republican and Democratic party platform committees advocates drilling for oil offshore, for oil and gas onshore, for coal mining in general, and for building pipelines to transport all these dirty fossil fuels around the country.[3] The industry institute applies this same backward-looking strategy to every region of the country, regardless of whether it's the most effective method.

It is clear that this strategy enhances the profitability of big oil companies. But it's much less clear that it enhances the interests of the American people.

And ultimately, it's a mirage. The United States cannot achieve lasting energy and economic security through resource extraction alone. An energy plan based solely on drilling and mining for more and harder-to-reach fossil fuels squanders the opportunity to diversify and strengthen our economy, threatens our nation's abil-

ity to lead in the global marketplace, and completely ignores the urgent need to combat climate change and reduce our dependence on fossil fuels. Furthermore, it dismisses the significant growth of the clean economy, a diverse set of industries that employs some 3.1 million Americans.[4]

This report provides an alternative vision, a better approach for America and the planet we share. Broadly, we present a vision that:

- Recognizes that our earth is warming, and our resources are finite, which means we must swiftly enact measures to make us global leaders in the face of that reality
- Mandates investment in multiple forms of energy and fuel so we are never dependent on just one finite resource for electricity and transportation needs
- Understands the unique assets of each region of our country, whether they are natural resources or infrastructure and workforce investments
- Relies on ambitious, large-scale projects to create new jobs and anchor strong economic development strategies to ensure American economic competitiveness and true energy independence well into the future

The promise of the clean economy is not a mirage or a far-off goal. It is being felt right now across our country. In the second quarter of 2012 alone, more than 37,000 new clean energy jobs were announced in projects across 30 states.[5] Recognizing the critical need to enhance our energy security, the U.S. military has become a major proponent of clean energy solutions such as biofuels, efficiency, and solar. The world's largest investors agree that long-term climate change and clean energy policy is a tremendous investment opportunity, "providing a robust foundation for economic recovery and sustainable long-term economic growth."[6]

In Washington, however, clean energy solutions have become highly politicized, due in no small part to aggressive lobbying by the fossil fuel industries. The relentless public relations campaign by conservatives to deride the fossil fuel causes of global warming clearly is paying off. The endless drumbeat of conservatives in Congress bashing the high-visibility—but quite rare—public investment failures such as the solar company Solyndra enables them to argue that renewable technologies don't work, and that any government action to promote them has no place in public policy. But this rhetoric is more than just false: It also denies the success of clean energy at the local level, often in the very states and districts from

which these congressional naysayers hail. According to a new report, 7 of the 17 states with the fastest-growing green jobs numbers are swing states or "red states" (Republican-leaning in the lexicon of the political scientist)—and red states lead the top 10 states with the largest share of green jobs as a percentage of total jobs. The top three states in that category feature more clean-tech workers than the entire U.S. coal mining sector.[7]

This politicization of energy has real-world consequences. Although investments in clean and sustainable energy systems have underpinned economic growth across America, political support for renewable energy, energy efficiency, and critical environmental protections is declining precipitously. Even policies that were originally enacted with bipartisan support have become almost impossible to move through Congress. Just one case in point: The production tax credit for wind energy is set to expire at the end of this year due to congressional inaction, even though both the House of Representatives and the Senate have introduced bipartisan bills during this session to extend the credit. Letters of support have poured into Congress from businesses across the country,[8] yet political gridlock means project developers can't get financing to put turbines in the ground, and turbine and tower manufacturers can't count on new orders coming into their factories. Altogether, letting the production tax credit expire means that 37,000 Americans working in the wind energy sector will probably lose their jobs by early 2013[9]—and that's just one energy policy for one energy sector.

It's not only renewable energy development projects that are on the chopping block. If passed by Congress and signed into law, the House appropriations bill for energy and water programs for fiscal year 2013 would slash funding for the Department of Energy's overall research and development programs by 11.6 percent, undermining efforts by our national labs and universities to discover and commercialize the low-carbon technologies of the future.[10]

When even relatively uncontroversial programs such as early-stage research and development are under fire, we know the politics of energy have changed for the worse. Paradoxically, though, the actual economics of energy have changed for the better. We've seen significant technological advancement in both fossil fuel development and in renewable and efficient energy solutions. Just a few short years ago, we couldn't have dreamed of the vast shale oil-and-gas resources that would be opened up by new drilling and hydraulic fracturing, or "fracking." We couldn't have imagined the declining rate of coal as a percentage of our nation's electricity mix as a result of these discoveries. We couldn't have known that solar energy

would have nearly achieved cost parity with more traditional forms of energy. And we couldn't have predicted the meteoric advance of new vehicle technologies that would dramatically reduce our carbon footprint in the transportation sector because of dropping demand for gasoline.

In the face of all this political dissention and technological upheaval, the question remains: What is America's energy future?

This paper does not disregard the role of fossil fuels in the U.S. economy. It instead looks beyond the finite contributions that fossil fuels can ultimately make to our nation's energy security and economic prosperity. It also challenges the idea that fossil fuels provide a one-size-fits-all answer to America's energy needs. Every region of our nation has its own intrinsic resources and can contribute in its own way toward the overall movement away from a carbon-only energy future. This paper recognizes the inherently regional nature of energy and sustainability.

In contrast, the vision for America presented by the American Petroleum Institute and its supporters in Washington and across the country embraces a "drill-here, drill-now" agenda without regard to the long-term economic and environmental consequences or to the specific needs of America's diverse regional economies. It ultimately is a shortsighted strategy that will not work. Diversifying away from these fossil fuels is an urgent and essential step to ensuring our long-term climate stability and economic competitiveness.

This report focuses on non-fossil-fuel-driven economic development strategies in six major regions of the country. Specifically:

- Offshore wind on the Atlantic Coast
- Coastal restoration in the Gulf Coast
- Energy efficiency in the Southeast
- Advanced vehicles in the Midwest
- Wind power and solar power development and distribution in the Mountain West
- Solar power innovation and installation on the Pacific Coast

Organizations and individuals intimately familiar with each region have contributed chapters that identify core strategies that will make that region more resilient to the impacts of climate change, while also creating jobs and economic growth. These energy and resiliency strategies mostly take the form of regional

approaches to create low-carbon or no-carbon electricity or fuel to serve each part of the country.

For the Gulf Coast, however, the author focuses on the critical need to restore economically important coastal wetlands, which provide vital ecosystem services as storm surge buffers, pollution filtration systems, and fisheries nurseries. This report will show that this region, which has been paying the price for decades of oil-and-gas drilling and refining, can transition away from extraction to diversify and strengthen its economy.

For each region, the authors explain the economic and environmental rationale behind choosing one particular solution. There are shorter sections, as well, which highlight additional regions or strategies that are particularly important to the nation's energy strategy. These additional sections of the report include the geographically distinct regions, including:

- Alaska, Hawaii, and New England, all of which boast particularly high energy costs and are all the more focused on energy diversity as a result
- The stellar wind energy region in Iowa, which has been a huge economic success story for that state
- Energy efficiency programs that are critical for every single state and region to pursue as they march toward greater energy independence

Although the authors tried to be as inclusive as possible, they haven't addressed every region of the country. Nor have they identified every possible energy generation or resiliency solution for each region. Though the clean energy economy for each state and region is multifaceted, this report highlights specific projects that are currently in operation or that have proven and achievable potential to create significant jobs and sustainable industrial development.

These regions and strategies were chosen to expose a choice fundamentally critical for the future of the country and the planet. The path offered by the American Petroleum Institute and its supporters leads to a dead end—finite resources expended in blind disregard to environmental consequences.

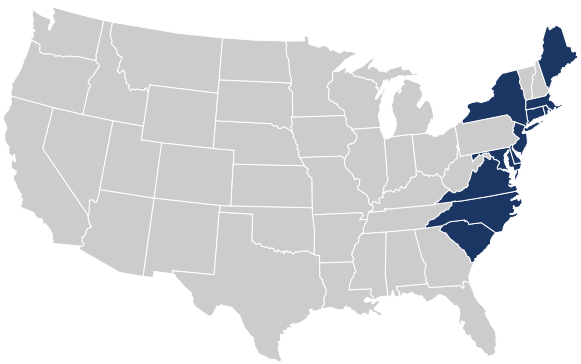
The solutions presented below point to a different road—one that highlights clean energy and stewardship as economic drivers that are as powerful as the fossil-fuel industry, one that is available today and sustainable for tomorrow, and that bends us away from our current trajectory of global climate change and self-destruction.

This is a vision that is uniquely American. One of this country's greatest strengths throughout its history has been its huge size and resource diversity, and by capitalizing on the unique strengths of each region, we can harness this diversity to move toward a brighter economic and energy future.

Harnessing the wind off the Atlantic Coast

By Marissa N. Newhall, Clean Energy Group

From New England to the Southeast, in Washington and in state capitals, there are oil and gas industry executives and their allies who look out across the Atlantic seashore and immediately think: Drill there, drill now. The American Petroleum Institute wants to open up the entire Atlantic Outer Continental Shelf to oil and gas drilling, regardless of the risk to existing coastal industries or whether this is in fact the most effective economic development strategy for the region.[11]



Indeed, expanded offshore drilling is not the only option. The Atlantic region's vast natural resources, pre-existing infrastructure, and status as one of the nation's largest energy load centers make the area prime territory for offshore wind development. In fact, the Department of Energy classifies Atlantic coastal wind resources as "outstanding," a rating stronger than any land-based wind resources in the nation.[12]

The Atlantic coastal region is particularly well-suited for offshore wind power development

Resource availability and energy generation potential are high

Not a single wind turbine sits in water off any U.S. coastline. Yet the U.S. Department of Energy estimates that more than 4,000 gigawatts of electricity—more than four times what the U.S. power system can currently produce—could

be generated from winds blowing above coastal waters.[13] More than a quarter of this wind power could be harnessed from winds over the Atlantic Ocean. As an initial goal, the U.S. Department of Energy's National Offshore Wind Strategy includes 10 gigawatts of commercially competitive offshore wind by 2020, and 54 gigawatts by 2030.

Developing even a fraction of the available offshore wind resource would greatly outpace the amount of fossil fuel energy available in the Atlantic Coast region. Atlantic Ocean offshore oil resources extracted over 20 years amount to 18 gigawatts; offshore wind resources, when considering only middle-Atlantic areas up to 50 meters deep, would amount to 450 gigawatts, or 177 gigawatts average power output.[14]

Some might see this as comparing apples to oranges—after all, we primarily use oil for transportation, whereas wind energy would mostly go into electricity generation—but the evolving energy mix makes it a valid comparison. Electricity is powering more and more vehicles, and gas is contributing more and more to electricity, meaning that replacing watts from oil and gas with watts from offshore wind isn't such a stretch.

Furthermore, the relatively shallow depth of the Outer Continental Shelf—which begins a few nautical miles from shore and extends 200 nautical miles outward along much of the Atlantic Coast—means that Atlantic states are well-suited to take rapid advantage of current offshore wind technology (turbines that generate up to 6 megawatts). Future generations of larger, even more efficient turbines, generating between 8 megawatts and 10 megawatts, can be built further away from the shoreline.[15]

Offshore wind farms would be close enough to population centers to deliver reliable energy during times of peak seasonal demand

According to the National Renewable Energy Laboratory, U.S. coastal urban areas "are home to much of the U.S. population; have the highest electricity prices in the nation; and currently depend heavily on a high-carbon, volatile supply of imported fossil fuels."[16] In the past decade, the Northeast has led all other U.S. Census Bureau regions in total energy consumption.[17]

Pennsylvania, New York, North Carolina, and Virginia are all in the top 15 energy consumer states in the country and include some of the largest metropolitan areas in America.[18] With high-density industrial areas, these population centers cur-

rently rely on a hodgepodge of dispersed inland coal and nuclear plants to meet their electricity needs. Thanks to outdated infrastructure, transmission from these plants can be inefficient and contributes to the national average of 7 percent loss of electricity along the way.[19]

Offshore wind is the only utility-scale renewable energy resource abundant enough to contribute substantially to the sustained, long-term energy demands of the Atlantic Coast region, especially because many of these states have enacted so-called Renewable Portfolio Standards dictating that a percentage of energy be generated from renewable sources. Offshore wind farms would also be constructed relatively close to shore and therefore to population centers, and when electricity travels shorter distances, there is less electricity lost along the way. Because the transmission lines would be new and state-of-the-art, they would further decrease the amount of losses when compared to outdated, land-based transmission lines, while in turn boosting demand for the products and services needed to put these lines in place.

Additionally, Atlantic Coast regional energy load centers are under huge strain during times of peak demand and seasonal weather extremes. Offshore wind would generate more energy during those peak hours, which would lessen this strain. Data collected from a test tower at the site of Cape Wind—a wind farm set for construction 6 miles off the shore of Cape Cod in Massachusetts—showed promising results for both summer and winter. The tower registered strong afternoon winds on hot summer days, "when air conditioning use pushes electric demand in New England to historic peaks,"[20] and "full capacity" operation during a three-day cold snap in January 2004, when a natural gas shortage forced electrical grid managers to contemplate rolling blackouts.[21]

Proposed infrastructure will pave the way

In May the Department of the Interior declared no competitive interest for a mid-Atlantic transmission backbone project, the Atlantic Wind Connection, meaning the project can move forward with acquiring the permits necessary for construction. This sweeping project—funded by Google Inc., Bregal Energy, Marubeni Corp., and Elia System Operator NV/SA—will provide the foundation for future offshore wind farms and is designed to exploit economies of scale and reduce impacts on sensitive coastal environments. Once built, the Atlantic Wind Connection would have the potential to connect 7 gigawatts of offshore wind power back to land, funneling reliable, price-stable energy to

thousands of homes and businesses and reducing installation costs for offshore wind developers—each of whom would otherwise have to build an independent transmission line to shore.[22]

The offshore wind energy generation interconnected through the project is predicted to reduce production costs from fossil fuel generation by $1.1 billion per year,[23] making the project a game-changer for energy consumers up and down the Atlantic Coast. Meanwhile, research facilities in Maine, Virginia, and South Carolina are already working to create a tech cluster in the region, pushing research and development that will advance offshore technology and spur its adoption.

Offshore wind farms will create jobs and build the regional economy

Developing a commercial-scale offshore wind industry will create significant regional employment opportunities

A wind turbine is made up of as many as 8,000 components.[24] If produced in the United States, the installation of new large-scale wind projects off the Atlantic Coast could translate into much-needed jobs across a wide range of occupations and industries. The National Renewable Energy Lab estimates that the Atlantic states "would generate $200 billion in new economic activity and create more than 43,000 permanent, well-paid technical jobs in manufacturing, construction, engineering, operations and maintenance" if just 54 gigawatts of available offshore wind resources were developed in this region.[25] A more recent report from the National Wildlife Federation referenced research showing that harnessing just 7.7 gigawatts of already-identified offshore wind resources could lead to the creation of 300,000 jobs.[26]

More than 40 states currently have facilities for building wind turbine components. In fact, most components of existing U.S. wind farms are made in America.[27] Offshore turbines are larger, and their components require closer-to-site fabrication, which has the potential to boost the domestic wind manufacturing industry from its current employment level of about 75,000 jobs.[28]

These are not idle predictions. Offshore wind in Europe has grown steadily over the past decade. The European Wind Energy Association estimates that the indus-

try will employ 169,000 people by 2020, and 300,000 people by 2030.[29] Countries that were "first movers," or the first to establish a welcome environment for manufacturers in the offshore wind supply chain, dominated export markets on the continent. In Denmark—an early supply chain hub—the wind industry accounts for 8.5 percent of total annual exports and employs 25,000 people. In Germany—a "first mover" in land-based wind that is now setting ambitious offshore generation goals—more than 90 large domestic manufacturing facilities have created 40,000 jobs.[30]

The benefits of Atlantic offshore wind

Developing 54 gigawatts of offshore wind in Atlantic waters

Coal-fired power plants displaced	52
New economic activity generated	$200 billion
Permanent technical jobs in manufacturing, construction, engineering, operations, and maintenance created	43,000

Source: National Renewable Energy Laboratory; University of Sydney

The Atlantic coastal region is particularly well-suited to become just this kind of first mover in North America. With existing port facilities, manufacturing capacity, and marine expertise, states such as Maryland, Massachusetts, and New Jersey—three states where wind-energy developers have proposed offshore wind farms—could reap huge economic rewards by establishing a hub for an entire regional, or even national, industry. Maryland's Eastern Shore has a rich history of shipbuilding expertise and is already drawing interest from several companies that are capable of producing wind turbine components. Recently, a Salisbury, Maryland-based manufacturer called AC Wind pledged to spend $10 million to convert a former boat plant into a turbine blade production facility.[31] At full capacity, AC Wind says this facility could employ more than 200 people.

In Massachusetts, the Cape Wind project is expected to create 1,000 regional jobs during construction and 50 permanent jobs for ongoing operation and maintenance—not to mention that a local cruise company plans to build a visitor's center and train local community college students for jobs giving boat tours of the wind farm.[32] General expectations for job creation range from primary and secondary manufacturing to jobs in direct services such as installation, maintenance, and transport of turbine components, as well as indirect services such as banking and communications.

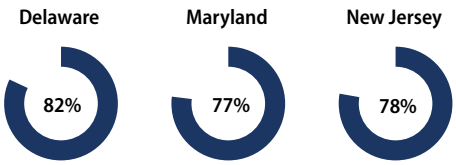
Offshore wind has broad public support

Majority of ratepayers willing to pay more for homegrown electricity produced by wind farms off their coastlines

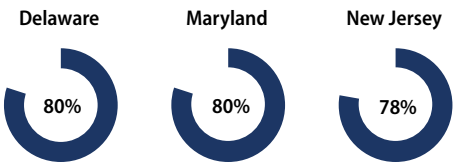
Despite vehement opposition from fossil fuel industry interest groups and the politicians they support, offshore wind is popular among energy consumers. Surveys commissioned in 2011 by Atlantic Wind Connection in Delaware, Maryland, and New Jersey show majority support for offshore wind development among voters of both parties in all three states. Furthermore, majorities in each state said they would be willing to pay at least $2 more per month in utility bills to receive offshore-generated wind power, and majorities in Delaware and Maryland prefer that the clean, renewable electricity production quotas be filled by nearby offshore wind rather than land-based wind farms in the Midwestern United States.[33]

Public support for Atlantic offshore wind

Voters supporting the development of offshore wind off their coasts



Voters willing to pay at least $2 more per month to receive electricity generated from offshore wind



Source: FederickPolls for Atlantic Wind Connection

Despite the public battle over Cape Wind in Massachusetts, a substantial majority of the state's residents also support offshore wind, along with other renewable energy projects. In 2011 a public opinion survey by the think tank MassINC on issues related to climate change asked Massachusetts residents if they would favor or oppose policies that would raise their monthly electricity bills by set amounts to accommodate renewable energy from wind and other sources. Eighty percent supported a $1 increase; 69 percent supported a $3 increase; and 60 percent supported a $5 increase. The same poll found that 80 percent of respondents were willing to pay the rate increase estimated by Massachusetts Department of Public Utilities once Cape Wind came online.[34]

New Jersey residents are also willing to make a bet on offshore wind. In 2009 Fishermen's Energy, a community-based offshore wind developer in New Jersey, commissioned a survey to gauge public sentiment on a proposed wind farm that would be located three miles offshore from Atlantic City. After being shown photo illustrations of what the turbines would look like, 75 percent of those surveyed said they favored the project. When asked if the wind turbines would have a positive or negative effect on Atlantic City, 66 percent said the turbines would have a positive effect.

Offshore wind conserves and protects natural resources

Reduces reliance on both foreign and domestic sources of fossil fuels

Developing 54 gigawatts of offshore wind in Atlantic waters would displace the annual output of 52 coal-fired plants, transitioning a large chunk of America's energy economy toward a renewable, safely harvested, and predictably available resource. Per kilowatt-hour of energy consumed, offshore wind emits less than 1 percent the greenhouse gases of coal.[35]

Offshore wind also would greatly decrease the region's reliance on nuclear power and natural gas, two other big players in the East Coast energy mix. A recent report from the National Wildlife Federation estimates that developing equivalent offshore oil resources would release 97.2 million metric tons of carbon dioxide each year, "the amount of carbon dioxide emitted by almost 17.7 million cars annually."[36] And as the region's nuclear power plants age, concerns about waste disposal and the potential effects of natural disasters—such as the earthquake centered in Mineral, Virginia, in 2011 that rattled the reactor at the North Anna Nuclear Generating Station—are a convincing argument to phase in more stable sources of energy.

Furthermore, offshore wind could help the mid-Atlantic avoid the environmental and public health costs associated with fossil fuels. It is a myth that fossil fuel energy is cheaper than renewable energy. On the contrary, researchers at Harvard Medical School estimate that the average external costs of fossil fuels—such as negative health and environmental consequences of burning coal—is 18 cents per kilowatt hour. When added to the market price of fossil-fuel energy, this additional social cost makes traditional energy, especially coal-based energy, far more expensive than renewable energy sources such as offshore wind.[37]

Offshore wind's damage to wildlife is minimal

Studies show that marine wildlife, including migratory birds, can be protected from offshore wind development with smart siting and mindful wildlife impact assessments.[38] Because the oceans are the world's great carbon sink—holding about 50 times as much carbon as the air—the effects of global warming (a direct result of burning fossil fuels for energy) are likely to have more adverse

effects on marine wildlife and sea birds than any potential interaction with offshore wind farms.[39]

One study shows that marine wildlife is thriving around wind turbines. The National Institute of Aquatic Resources in Denmark discovered "positive reef effects" around turbines at the Horns Rev 1 wind farm, including attracting several species of fish to the new reefs.[40]

The risks posed by offshore oil and gas drilling on the Atlantic Outer Continental Shelf, however, are much more severe. The presence of rigs, increased seismic activity, and the potential for an oil spill present a very real danger for the existing coastal industries that form the backbone of this region such as tourism in the Outer Banks of North Carolina, the Eastern Shore of Virginia, Maryland, and Delaware, and the Jersey shore, as well as some of our nation's oldest fishing communities, all of which rely on healthy oceans for their survival.

State and federal policies must progress rapidly

To make offshore wind a reality in the United States, states and the federal government must move swiftly to put out the welcome mat for developers and manufacturers.

So far, the U.S. Bureau of Ocean Energy Management's Smart From the Start initiative is improving cooperation between federal agencies responsible for the permitting and leasing of offshore wind farm sites. The Department of Energy has laid out a vision for developing 52 gigawatts of offshore wind off American coastlines by 2030, and several Atlantic Coast states have Renewable Portfolio Standard laws that require stepped-up use of renewable energy in the next five years to 20 years. In 2012, for example, the New England Governors Conference voted unanimously to develop a coordinated plan for regional purchases of renewable energy, of which offshore wind could be a huge source.[41]

Despite these efforts, it will be difficult to build the investor confidence needed to develop utility-scale wind farms off the Atlantic Coast without near-term federal support in the form of extending the federal production tax credit and investment tax credit, and innovative power purchasing strategies. A recent analysis from the Offshore Wind Accelerator Project found that "aggregated procurement"—essentially when buyers' networks contract with developers to purchase large

amounts of energy in tandem with low-cost financing and use of the investment tax credit—could result in an expected cost of energy for offshore wind of $95 per megawatt hour, on average. This would make offshore wind power highly competitive with other forms of electricity in the United States.[42]

Meanwhile, elected officials and regulators must build support for state-backed, economically viable offshore wind development projects in key states such as Maryland, where a bill supporting offshore wind development failed to pass by a narrow margin in 2012.

Such sensible, economically friendly policies at the state and federal level have fallen by the wayside. In March, for example, 47 U.S. senators filibustered a bill that would have extended tax credits for wind energy. In opposition, Sen. Jim Webb (D-VA) echoed a flawed refrain: "Government should avoid picking winners and losers and should allow the marketplace to work." But those who voted against the bill, including Sen. Webb, are already picking a winner: the fossil fuel industry, which stood to lose $24 billion in tax breaks if the bill passed.

Perhaps not surprisingly, Sen. Webb and his 46 colleagues receive a combined $23 million in career contributions from Big Oil.[43] Federal subsidies and tax breaks to oil and gas companies are projected to total more than $55 billion between 2011 and 2015.[44] These types of subsidies made sense in the early 1900s, when the fledgling industry needed help getting to scale. But today fossil fuels are no longer in need of handouts.

In contrast, offshore wind and other fledgling industries could greatly benefit from these scarce public dollars. Once economies of scale are reached, and turbines are in the water, offshore wind generation will be reliable, plentiful, and will have a predictable long-term price tag, freeing American ratepayers from dependence on fossil fuels (both foreign and domestic) and nuclear power. The U.S. offshore wind industry—similar to the big oil and gas companies before it—should at that point have no problem standing on its own.

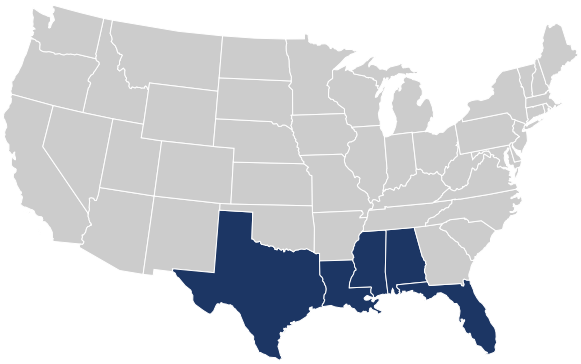
The American Petroleum Institute and its supporters want to open up the Atlantic Coast to oil and gas drilling, taking more fossil fuels out of the ground despite the fact that our offshore reserves are unproven and that offshore drilling poses a serious threat to the existing coastal industries that sustain these states. In contrast, the same Atlantic Coast is prime territory for a regional offshore wind development effort that would spur a diversity of new industries and jobs, while

providing reliable power to its industrial and residential consumers. All this could be accomplished without unduly compromising the region's tourism, fishing, and shipping industries.

Offshore wind is simply a better solution to the mid-Atlantic's energy needs than expanded offshore drilling. It's time for Congress to give the new energy economy a fighting chance.

Rebuilding a resilient and sustainable Gulf Coast

By Jeffrey Buchanan, Oxfam America



Unlike the Atlantic Coast, which has so far been closed to offshore oil drilling, America's Gulf Coast is one of the country's most productive oil-generating regions and has been for generations. If the American Petroleum Institute gets its way, the long-term strategy for the region is simply this: Drill more, including areas in the eastern Gulf, even though that area is off-limits to drilling to protect Florida's tourism and recreation industries. But it's not that simple. To remain economically vibrant, diverse, and resilient to frequent extreme weather events and the consequences of oil and gas and other development, the coastline, estuaries, and wetlands that define the Gulf Coast must be repaired and restored. Doing so is vital to the health and safety of the region and offers a tremendous economic development opportunity.

The recent history of America's Gulf Coast region includes two major disasters: Hurricane Katrina in 2005 and the BP Deepwater Horizon oil spill in 2010, highlighting anew the rich, complicated relationship between the natural resources and economy of the region. The Gulf of Mexico is a powerful economic engine, driving not just oil and gas development but also industries such as transportation, food production, and tourism for the region and the entire nation. The Mississippi River and its delta, the Gulf's many ports, the beautiful shores and beaches, and the region's world-class fisheries promote billions of dollars in economic activity annually. For instance:

- Tourism and recreation provide more than 620,000 jobs along the Gulf Coast, about 8 percent of total jobs. Along the Mississippi coast, it accounts for one in five jobs.[45]

- Hosting 13 of the nation's 20 largest ports by tonnage, the region transports 50 percent of the nation's international trade, including much of our food exports. This accounts for one in seven jobs statewide in Louisiana.[46]

- More than 23 million recreational fishing trips are taken annually in the region, more than 30 percent of the U.S. total.[47] This accounts for $41 billion in economic activity annually supporting more than 300,000 jobs.[48]

- More than 30 percent of the nation's seafood—1.3 billion pounds annually, including more than 70 percent of our nation's shrimp and oysters—are harvested in the Gulf.[49]

The Gulf of Mexico also provides thousands of jobs in the oil and gas industry. Generations of workers primarily in the Central Gulf (from Alabama to Texas) have found work in offshore oil and gas production, going back to the 1940s, when Cajun fishers used shrimp boats to supply Texan oil men building the offshore industry beginning in southern Louisiana. More than 120,000 jobs in the Gulf Coast region and $12 billion in wages are linked to petroleum-related activities, which make up 1.4 percent of the region's total employment, according to the Bureau of Labor Statistics.[50]

Value of coastal industries in the Gulf region

Healthy coastal ecosystems are major economic drivers

Industry	Jobs	Economic activity
Tourism/recreation	620,000	$94 billion
Recreational fishing	300,000	$41 billion
Commercial fishing and seafood	213,272	$10.5 billion

Source: U.S. Travel Association; National Marine Fisheries Service

The vast majority of this activity is off the coast of Louisiana and Texas. This is because Florida primarily rejected offshore development over fear that it would harm the state's $67 billion coastal tourism and $13 billion outdoor recreation annual markets.[51]

Most of the region's oil production today—about 80 percent—occurs in offshore wells constructed in what is classified as deepwater (between 1,000 feet and 4,999 feet) or ultra deepwater (more than 5,000 feet), with drilling depths reaching as deep as 6.5 miles.[52] As was evidenced all too painfully by the 2010 Deepwater Horizon oil spill, these activities come with significant economic and environmental risks and, when disaster strikes, can adversely affect the region's other core industries, among them fisheries, recreation, and tourism.[53]

The explosion aboard the Deepwater Horizon oil rig killed 11 workers and spewed 4.9 million barrels of oil into the Gulf of Mexico. More than 1,050 miles of shoreline were fouled with oil, and as many as 200 miles, mainly marshes where cleanup is not feasible, remain covered in oil.[54] Fishermen reported unsettling changes in some areas, ranging from lower-than-average shrimp catches to the complete collapse of oyster beds.[55] Reports of disfigurements such as shrimp with no eyes and crabs born with oil in their shells only added to the concern. Initial research shows certain populations of fin and shellfish in key estuaries reacting poorly to oil and chemical dispersants used to break up spilled oil.[56]

In addition, the oil is accelerating the destruction of certain wetlands, a key nursery for important species.[57] Already many fishermen are experiencing losses and underemployment. A new study says that over seven years, this oil spill could cost an additional $8.7 billion in losses in the fishing economy of the Gulf of Mexico, including the loss of close to 22,000 jobs.[58] While the full economic impact will not be known for several years, the oil company responsible for the catastrophe—BP plc—has paid out more than $7 billion in economic damage claims to workers and business owners so far.[59]

The inherent volatility of fossil fuel extraction—combined with the increased risks of deepwater drilling—certainly highlight the need to evaluate the full scale of future drilling strategies in the region and also point to the importance of diversifying the region's economic base in case of future disaster.[60] Indeed, the BP oil spill struck when the region's ecosystem was already in trouble. In recent years, the health of the Gulf of Mexico and its bays and tributary rivers have declined precipitously, jeopardizing the many valuable assets and livelihoods the Gulf provides. Already lost are up to 50 percent of the region's inland and coastal wetlands, 60 percent of its sea grass beds, more than 50 percent of oyster reefs, and almost a third of its mangrove forests.[61]

In Louisiana a football field of land in the Mississippi River Delta disappears into the Gulf every hour.[62] By 2050 one-third of coastal Louisiana will have vanished into the Gulf of Mexico. Similarly, since the mid-1900s nearly 2,000 square miles of fish nurseries, shrimping grounds, recreational paradise, and communities have been lost.[63] This has huge implications for the region's economy and its communities. At least 97 percent (by weight) of the commercial fish and shellfish landings from the Gulf of Mexico are species that depend on estuaries and their wetlands, especially in the Mississippi River Delta, at some point in their life cycle.[64]

There are two main historic sources for all this erosion: construction of the Mississippi River's levee system and development by the oil and gas industry.[65] Starting in the 1880s the U.S. Army Corps of Engineers began constructing levees up and down the Mississippi River to provide flood protection to communities and farms through the heart of the nation's breadbasket. But the levees impaired the ability of the river to carry and distribute sediment into the river's delta and to sustain land in southern Louisiana. In the early to mid-20th century, the oil and gas industry dredged thousands of miles of canals and pipelines through the Delta to carry its products to market without regard to the importance of the marsh.[66] In Louisiana, according to one study, between 40 percent and 60 percent of the total wetland loss between 1932 and 1990 in the Mississippi River Delta Basin can be directly attributed to oil and gas operations.[67]

These activities have also contributed to subsidence—meaning that land is actually sinking—which compounds land loss. Mississippi, Alabama, Florida, and Texas are also experiencing shoreline and marshland loss.

These factors are all compounded by climate change and a relative sea level that is forecast to rise by between 5 inches and 6 inches by 2030 and by between 2.5 feet and 5 feet by 2100. When added with the predictions of stronger winds, hotter water temperatures in the Gulf of Mexico, and a greater impact from hurricane storm surge, such change could significantly strengthen extreme weather in the region—to the tune of $13.2 billion in additional annual climate-related damage.[68]

The consequences of wetland erosion and the benefits of protection and preservation

The rapid loss of wetlands has serious implications for the resiliency of the Gulf Coast's economy and environment. Wetlands provide multiple critical ecosystem services such as filtering hazardous manmade pollutants, including pesticides, metals, and fertilizers. Each acre does $35,000 to $150,000 of work done in a comparable water treatment plant.[69] This improved water quality reduces costs for homeowners and businesses, and improves real estate values.

Healthy wetlands, barrier islands, and oyster reefs also protect homes and businesses by reducing the impacts of storm surge, flooding, and sea-level rise. Over the next 20 years, according to a recent study by the regional utility company Entergy Corp., the Gulf region faces $350 billion in economic damages from

hurricanes, flooding, and sea-level rise, and the severity of these extreme weather events will only be exacerbated by climate change.[70]

Investing in coastal restoration can help mitigate these risks. Even the region's oil and gas industry—particularly its production, refining, and transportation infrastructure located along the coast—faces risks as a consequence of these ecological changes. According to America's Energy Coast, a regional coalition of oil and gas, conservation, and other interests:

> *Environmental threats—intense storm events, sea level rise, subsidence, and coastal erosion—put our ability to sustain [oil and gas] infrastructure in jeopardy, compromising pipeline integrity and posing a significant national security threat.*[71]

These risks highlight why fossil fuel producers such as Chevron Corp., the Royal Dutch Shell Group, and the American Petroleum Institute actually support state and federal investments in coastal restoration.

Wetlands not only help the region stay resilient in the face of damage from climate change but also are one of the best ways to mitigate that damage. Wetlands are the largest global carbon sinks, meaning that they store carbon so that it is not released into the atmosphere. Worldwide, these areas comprise just 4 percent of all land but hold almost 33 percent of the world's organic matter. Wetlands are anaerobic (low- to zero-oxygen) environments, and thus good for carbon storage.[72]

As such, wetlands are potentially a moneymaker in a carbon-constrained economy, especially if the United States ever imposes a price on carbon. A New Orleans-based firm, Tierra Resources, LLC, already boasts a methodology with the American Carbon Registry to finance coastal wetland restoration through carbon offset purchases. The firm found that each restored acre of wetlands generates between 5 tons to 40 tons of carbon sequestration per acre per year for decades. Planting trees, by comparison, generates about 5 tons to 7 tons.

While carbon offsets in the United States represent a largely voluntary market to date, California's carbon cap-and-trade program will become the world's second-largest regulated carbon market in 2013 and may open up a new substantial market for Gulf Coast wetland restoration carbon offsets. Future federal climate change policy could also open additional opportunities to finance coastal restoration through carbon offset programs.

In addition to pressing environmental concerns, the region is in desperate need of new industries and job opportunities. Alabama, Florida, Louisiana, Mississippi, and Texas rank among the worst states in the country for economic mobility and poverty.[73] While some areas of the coast are home to relative wealth, small fishing communities such as Dulac, Louisiana, Apalachicola, Florida, Bayou La Batre, Alabama, Point au La Hatche, Louisiana, and Pascagoula, Mississippi face double to triple the national poverty rates. These communities have always been places of limited means and have faced greater risk of disaster due to social vulnerability. A healthy Gulf put a roof over the heads of and food on the table for many low-income families for generations. But now, after Hurricane Katrina and the BP oil spill, small multigenerational family fishing and seafood enterprises are under threat.[74]

The restoration economy may offer a way into a new set of industries and jobs for many of these families. Oxfam America conducted focus groups with coastal restoration businesses to identify career opportunities in coastal projects. The study found occupations such as boat captains, welders, fitters, and deckhands offered high-demand middle-skilled jobs that paid above median wages, where fishers had some transferable skills, with some training and on-the-job experience.[75] Funding job training and placement programs could be a way to help underemployed fishers find new careers in the restoration economy. In addition, industry leaders note these jobs can also be a good source of upward economic mobility.[76]

Adding to the economic benefits of large-scale investment in coastal restoration is the long-term potential to develop regional economy hubs that create jobs and generate economic activity across a variety of sectors. The design, construction, operation, and monitoring of large-scale coastal and marine restoration projects represents a growing business whose impact ripples throughout the region's economy. Contractors and subcontractors on restoration projects directly employ workers in the planning, construction, operations, and monitoring of projects. This, in turn, creates demand for manufacturing, growing, and maintaining supplies and equipment (boats, dredges, earthmoving equipment, plants) that are critical to constructing restoration projects and also that utilize local services such as fuel, lodging, and food-service providers. Additionally, the workers hired for the projects make purchases and reinvest in their local economies.

Studies find that each $1 million in investment in ecosystem restoration can create as many as 36 jobs in design, construction, and operations.[77] Much more so than in the oil and gas sector, the restoration sector includes jobs across a huge range of occupations and skill levels, including:

- Low-skill jobs such as laborers and nursery workers
- Middle-skill jobs such as U.S. Coast Guard-certified captains, heavy-equipment operators, welders, fitters, and engineering technicians
- High-skill jobs such as environmental and civil engineers, hydrologists, and biologists

Many of these jobs require skills similar to those used in the traditional oil and gas, as well as transportation, industries, meaning the region already has a trained workforce base that can transition into restoration occupations.[78]

South Florida's Everglades, where the nation's largest ecological restoration is underway, provides an example of the economic power of reversing decades of degradation. The first $1.5 billion in construction was projected by the Army Corps of Engineers to create 22,000 jobs.[79] Projections show that investing $11.5 billion in a comprehensive Everglades restoration could result in $46.5 billion in gains to Florida's economy and create more than 440,000 jobs over the next 50 years, thanks to improvements in water quality, fishing, recreation, hunting, and park visitation, according to a report by Mather Economics, LLC. For every $1 invested in Everglades restoration, $4 is generated in economic benefits.[80]

Job creation per $1 million investment

Coastal restoration projects generate significant local employment

Energy infrastructure projects	16.8
Transportation infrastructure projects	18.9
ARRA coastal restoration projects	17
ARRA labor-intensive coastal restoration projects	33
The Nature Conservancy coastal restoration projects	36

*Job creation varies depending on specific project.

Source: Natural Oceanic and Atmospheric Administration, The Nature Conservancy, and Political Economy Research Institute.

Louisiana also recognizes the need to invest in coastal restoration. In early 2012 the state released its Coastal Master Plan, a $50 billion 50-year plan for restoring Louisiana's coastal wetlands and protecting coastal communities. The plan included a range of projects such as restoring barrier islands, headlands, and shorelines as first lines of defense against storms. In addition to the recreational and commercial value of restoring these resources, the projects will reduce future risk from storms and flooding for coastal homes and businesses by as much as $18 billion annually.[81] This includes a $20 billion investment in sediment mining and marsh creation projects—the nation's largest commitment to such activities, which has already helped to spur new investments by the dredging industry.[82] State officials hope fines and damages from the BP oil spill, including resources from the recently passed RESTORE the Gulf Coast Act, will begin to pay for this plan, though its completion will require additional federal and state resources.

These projects will be a source of job creation in the state well into the future. Already 1 out of every 14 construction jobs in the state is linked to coastal restora-

tion, according to the Louisiana Workforce Commission, and this number will likely climb in years to come.[83] Thanks to new legislation—the Louisiana First Hiring Act—the state is making new efforts to help local workers connect with contractors and find new career opportunities in the restoration economy by requiring firms to report available jobs at local workforce agencies.

The scale of the region's ecological challenges offers an exciting opportunity for business in the Gulf to turn those challenges into new economic markets. National and international leaders in heavy construction and engineering—Atkins North America, HDR, Inc., Arcadis US Inc., CH2M Hill, Bechtel Corporation, and Odebrecht S.A.—have been drawn to the Gulf Coast region. Many firms in more traditional sectors such as oil and gas services and navigation—among them the Shaw Group Inc. (now owned by Chicago Iron and Bridge Co.), Thompson Engineering Inc., Orion Marine Group, Inc., Cajun Industries, LLC, and CF Bean, LLC—have diversified their work to apply decades of experience in design and construction in the coastal and offshore environment to new lines of business tackling ecological problems.

A Duke University study of restoration projects found a stunning 67 percent of firms with such expertise and experience are located in Texas, Louisiana, Mississippi, Alabama, and Florida.[84] According to the Duke survey, another 67 percent of firms in the sector are small businesses.[85] Given small businesses' contribution to creating jobs and the struggles of small and medium-sized businesses in the economic downturn, restoration work could provide a new way to retain or grow these vital enterprises.[86] For most of the firms in the study, restoration makes up less than a quarter of their work. Oil and gas services, civil construction, and transportation are still many of these businesses' primary lines of work, but restoration represents a new market for these products and services that could grow with additional public investments in projects.

The Gulf is also home to more than 330 research laboratories, organizations, and programs working on coastal and marine sciences.[87] Building upon decades of research and collaboration, universities and colleges in the region generally work together on research projects informally in an effort to find the best techniques for permanent coastal repair and conservation. New initiatives—among them the Water Institute of the Gulf in Baton Rouge, Louisiana, and the National Oceans and Applications Research Center in Hancock County, Mississippi—will only build on this expertise.

The way forward

With so many businesses engaged in restoration and a growing set of research institutions tackling water management challenges, the region is truly emerging as a center of excellence in restoration innovation and jobs. State and local economic development agencies have taken note, launching new initiatives to support the restoration economy and further build community resilience. Realizing that many of its core industries saw slowing growth potential, Louisiana Economic Development—the state's economic development agency—set out to find new high-growth markets to diversify into building on existing strengths. Water management, including coastal restoration, was found to be one of the state's top options. A study by the consulting firm McKinsey & Co., estimates that $3 billion to $4 billion per year by 2029 will be spent in the state in water management, generating and sustaining as many as 45,000 new jobs. This will provide new markets for businesses in the state, helping to diversify its industrial base.[88]

Coastal restoration is not only a need along the Gulf Coast. According to the global reinsurance company Swiss Re, by 2030 the world will spend anywhere between $35 billion and $135 billion a year on coastal flood defense, flood-resistant buildings, and other adaptations.[89] With new markets in Asia and elsewhere developing coastal management plans that include restoration and green infrastructure activities, this could create a new export industry for the Gulf Coast.[90]

Federal and state policy will have a big influence on the Gulf Coast's emerging restoration economy and the implementation of restoration projects, particularly those funded by fines from the Deepwater Horizon oil spill. The so-called Natural Resource Damage Assessment of the spill requires responsible parties to restore natural resources lost as a result of the disaster, which could fund billions of dollars in restoration projects. In addition, Congress passed the RESTORE the Gulf Coast States Act on June 29, 2012, which guarantees 80 percent of Clean Water Act fines paid by the responsible parties will be dedicated to economic and environmental restoration projects in the affected states.

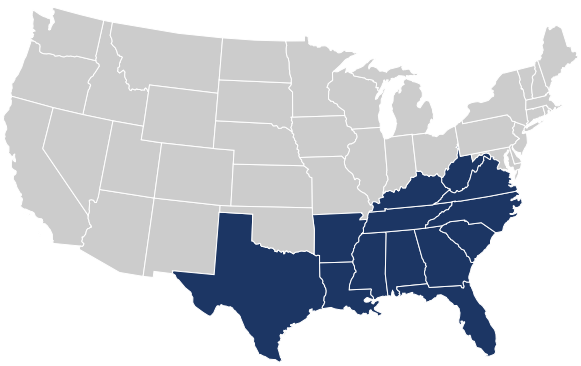
It is crucial that the Department of Justice and state and federal trustee agencies hold the responsible parties fully accountable for the consequences of this tragedy on the region, its resources, and its working families. Once funds are in hand, which could still be years away, priority should be given to projects that create socioeconomic benefits by maximizing job training and contracting opportunities for local workers and businesses and by ensuring that projects create ecosystem service benefits

for the economically and socially vulnerable communities that depend most on the region's natural resources for flood protection and their livelihoods.

The bright potential for the development of a thriving coastal restoration economy—one that creates jobs and spurs research and innovation, while simultaneously addressing the urgent need to restore the region's natural resources and curb carbon emissions—is proof that the Gulf coast does not need to remain solely reliant on oil and gas. There are options for diversifying beyond fossil fuels and improving the region's ecological, social and economic resiliency.

Centering smart and efficient energy technology in the Southeast

By Zoe Lipman, National Wildlife Federation



The southeastern United States is a diverse region that stands to gain significantly from a transition to a clean energy economy, both in the utility and transportation sectors and by drawing on its natural and industrial resources.

The region is historically dependent on fossil fuels, and the American Petroleum Institute's vision—which includes current and prospective shale plays, expanded drilling in the Gulf of Mexico, and the Keystone XL pipeline extension in the neighboring states of Texas and Oklahoma—promises little more than business as usual, built on yesterday's limited view of the region's capabilities and potential. In fact, the region is home to significant energy innovation, and the transition to a more diverse and modern energy infrastructure holds great promise for the region.

The Southeast has significant potential across a range of advanced energy technologies. Promising offshore wind opportunities exist for North Carolina and South Carolina,[91] and neighboring Texas has emerged as a leader in onshore wind. While currently underutilized, solar energy is also a strong potential job creator in the region, as is biomass, a resource extremely well-suited for the southern energy mix.[92]

The Southeast is second only to the Midwest in its concentration of advanced and efficient vehicle manufacturing and the diverse technology supply chain that supports it.[93] With significant auto manufacturing hubs in Kentucky, Tennessee, Alabama, North Carolina, South Carolina, and neighboring Texas and Missouri, the broader region stands to build thousands of jobs as the industry retools to build the cleaner vehicles that are our most effective response to high gas prices and less oil security.[94]

More proactive policy action at a local, state, and federal level could help push the region forward to better capture economic and environmental gains in all these areas, but an additional and unique opportunity exists for the region in the coming wholesale modernization of our electric infrastructure nationally and globally. This transformation encompasses both the technological transformation of our electric grid—so-called smart-grid innovation that will change everything from household appliances to utility-scale electric transmission and distribution equipment—as well as widespread basic improvements in household, business, and industrial efficiency.

The Southeast is an early leader in this emerging field, with numerous companies developing and producing advanced smart-grid technology. This new equipment and information technology improves the ability of utilities and customers to communicate, manage energy generation and distribution, and manage their energy equipment—whether that's a clothes dryer or a power plant. It also delivers a more reliable, efficient, diverse, and flexible electric system overall. With enhanced commitment to regional smart-grid deployment, the Southeast has the potential to become a leader in a growing global industry and reap the benefits of that leadership in the local economy.

At the same time, the region lags in deploying "traditional" efficiency policies such as statewide energy efficiency standards and programs to drive upgrades to residential and commercial buildings and industrial equipment.[95] Addressing the region's efficiency shortfall can provide an immediate boost to business competitiveness and household budgets in a region where many communities are also economically challenged.[96]

Taken together, efficiency and smart-grid innovation will deliver not only energy savings and environmental benefits but also jobs and economic development across a wide range of industries and professions—from local installation and repair jobs to manufacturing and high-tech engineering to software design. This vision provides an opportunity for the Southeast to be a global leader in energy innovation, while ensuring that local energy transition brings good jobs, lasting economic growth, and improved quality of life.

Smart grid: Building a 21st century energy system

The energy world is changing. New clean and renewable power generation gets a lot of press: Wind, solar, geothermal, biomass, and even wave power are rapidly expanding as communities and nations look for ways to make the power that families and businesses need in cleaner, cheaper, more secure, and often more local ways. But the need to meet modern energy demands is driving an equally profound change in how we move, manage, and use whatever energy we generate, making our electric system much more flexible, responsive, and efficient.

The Southeast still has a way to go to live up to its potential in clean energy generation but, as mentioned above, is an early leader in the new smart-grid energy infrastructure, which is a key element in making it possible to meet the energy demands of a rapidly growing and resource-constrained world.

The smart grid refers to a whole range of new technologies that network the electric power system and enable two-way information sharing, communication, and management of electric systems and equipment. These technologies enable utilities to use existing power plants and equipment far more efficiently, cut waste, and improve reliability while limiting the need for costly emergency power. The new flexible systems are also essential for the widespread integration of intermittent renewable power (such as large wind farms and solar power plants), distributed generation (such as home or business solar roofs, or commercial or industrial facilities that generate their own power) and electric vehicles. The value of increased reliability from smart-grid technology alone is huge, as power outages currently cost the U.S. economy about $150 billion a year.[97]

Smart-grid technologies also create an array of new business opportunities and consumer benefits, allowing residential and commercial customers to participate in and share the value of utility services. These include selling energy from rooftop solar panels back to the grid; enabling "microgrids" for homes, businesses, or communities that can stand alone and keep energy flowing during power failures; enabling electric vehicle owners to charge their cars when power is cheapest and cleanest—and potentially, when they're not driving, to use that car battery for power at home or to sell energy storage services to the grid. Consumers will also be able to control the technology and energy in their lives from their smart phones or laptops.

Finally, more efficient use of our energy infrastructure means significant energy savings, estimated at 12 percent to 18 percent of total electric-sector energy

use and emissions.[98] These savings are arrived at in significant part by engaging consumers in energy management in ways that not only provide savings but connect energy choices with better products, new services, and improved home or business energy security and control. These innovations can go a long way toward combating a perennial obstacle to efficiency adoption—spurring retail customers to action. Put differently, traditional efficiency is often not very sexy, but if combined with new products and services it can be.

The smart-grid transformation of the electric system is coming rapidly and globally. The global market value of smart-grid products was estimated at $69 billion in 2009 and is growing at more than 20 percent a year.[99] Leading smart-grid countries made $17 billion in public investment in the smart grid in 2010 alone—the bulk in China and the United States. A 2011 study by Duke University's Center on Globalization, Governance and Competitiveness argues that countries are coming to the smart grid with slightly different objectives. China and Brazil are looking to meet massive new electric infrastructure needs with state-of-the-art technology, while the United States is looking to upgrade aging infrastructure to improve reliability and enhance customer satisfaction. Japan and South Korea are largely focused on innovation for export, while Australia and Europe are looking to facilitate adoption of high levels of renewable and low carbon energy.[100]

All of these benefits beckon for industry leaders. The Southeast is well-positioned to benefit.

The Southeast is a leader in smart-grid technology

The Southeast is currently a leader in smart-grid development and deployment. In a study of leading companies in this field, the region boasted more firms (83) across the whole smart-grid value chain than any other region, with Raleigh, North Carolina, rivaling San Francisco as the leading city.[101] A subsequent study that examined local supply chains found 59 smart-grid-related firms with 101 locations in the Research Triangle area alone.[102]

Smart-grid innovation and manufacturing companies are found across the region. Georgia is also a leading state in smart-grid device manufacturing, research, and engineering, A 2011 survey of Georgia "smart energy" businesses by the Technology Association of Georgia Smart Energy Society indicated Georgia revenues from these businesses of $2.3 billion—and the group believes that this

is a conservative figure.[103] The utility equipment manufacturing giant General Electric, Co. has its Digital Energy business headquarters outside of Atlanta and opened its Smart Grid Technology Center of Excellence there in 2010, adding 400 jobs. The Grid IQ Experience Center, a "tourist attraction," is also aimed at explaining the smart grid to the public.[104]

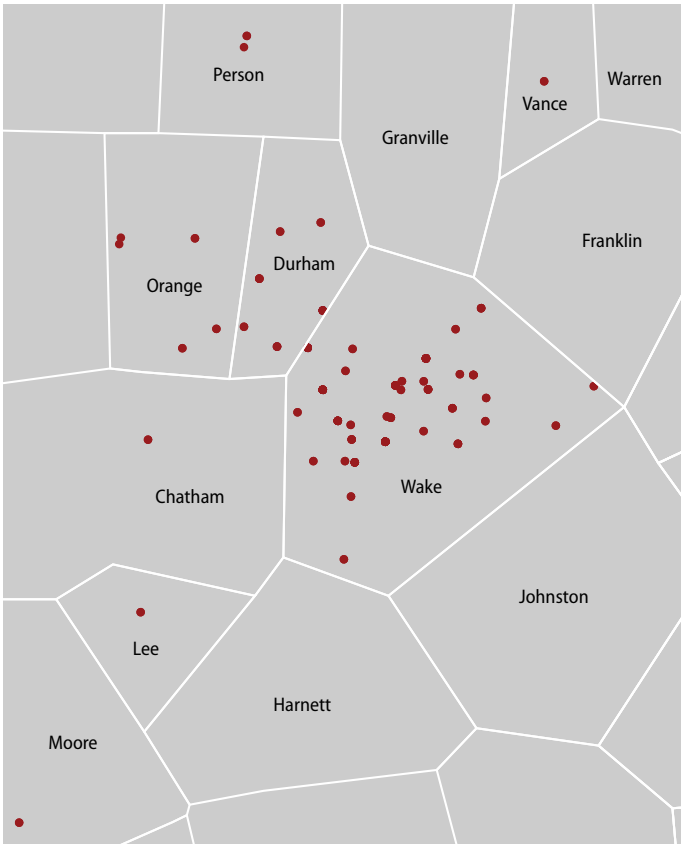
Utilities across the country, including in the Southeast, are rolling out smart meters as an important first step, but the Southeast has the potential to dive far deeper into smart-grid adoption.

The nation's best known and most comprehensive medium-scale deployment of advanced energy and transportation technology is happening just outside the Southeast region and can provide a good model for innovation within the region. In Austin, Texas, a committed municipal utility, Austin Energy, has been working with a supportive city government and leading research and corporate partners to simultaneously test high levels of renewable energy, electric vehicles, and smart-home technology—all integrated by smart-grid controls.[105] Other local utilities are also stepping up such as Lakeland Electric, a community-owned utility from Lakeland, Florida, which will deploy not just smart meters but also time-based rate programs and in-home displays and web equipment for customers to manage their energy use.[106]

At the opposite end of the spectrum, the huge Charlotte, North Carolina-based Duke Energy Corp. has a nearly $700 million project underway as part of the Department of Energy's smart-grid program. It goes modestly beyond advanced metering infrastructure and spans five states: North Carolina, South Carolina, Kentucky, Indiana, and Ohio.[107] In addition, the company is working with Department of Energy's Advanced Research Projects Agency, the Electric Power Research Institute, Toyota Motor Co., and others to pilot microgrids—or elec-

North Carolina's exceptional smart grid assets

In research triangle area alone: employee locations engaged in the smart grid industry



Source: Duke University Center on Globalization, Governance and Competitiveness at the Social Science Research Institute

tric vehicle connections to smart-grid technology and other facets of smart-grid deployment. Duke Energy is now the nation's largest electric utility, following its recent merger with Progress Energy, and it could be in a position to lead national smart-grid adoption from its base in the Southeast.[108]

Indeed, taken together, the concentrated local deployment made possible by comparatively small forward-looking municipal utilities working closely with city governments and elected leaders, along with the experience of large investor-owned utilities, could provide a foundation for the learning, policy leadership, and enhanced partnerships needed to drive forward much larger-scale smart-grid deployment in the region.

An engine of jobs and economic growth

A recent study of the smart-grid supply chain by Duke University's Center on Globalization, Governance and Competitiveness finds 334 company locations in 39 states today, and estimates that the industry has created 17,000 jobs in the smart grid supply sector to date.[109] These are jobs outside the utilities themselves and include developing, designing, building, and installing the technology that enables smart-grid services. Taking a closer look at a local level, the study cites estimates that about 3,000 people are employed in smart-grid businesses in the North Carolina Research Triangle alone.[110] Likewise, in its initial survey the Technology Association of Georgia Smart Energy Society estimated that there were almost 5,000 people employed in Georgia's "smart energy" companies.[111] Looking forward, different researchers estimate that nationwide implementation of the smart grid would add nearly 280,000 jobs, both in utilities and the supply chain.[112]

Nationwide, these jobs are in device manufacturing, hardware development, software development, and services, as well as strategic and management functions. Companies in the Southeast are currently quite evenly spread across these areas.[113] In addition, the region can draw on high-quality universities, and engineering and manufacturing talent, including in related renewable energy and electric vehicle fields and adoption.[114]

According to the same Duke University report, smart-grid expansion promises the opportunity for expansion and diversification of existing U.S. companies, as well as for export growth. The study predicts future job growth in smart-grid-related information technology innovation in product and systems development and

engineering, as well as innovative hardware manufacturing.[115] While the region will have to compete with other regions of our nation and with countries worldwide to retain some of these jobs, smart-grid deployment also creates installation, operations, and services jobs that must be performed locally within local utilities' service territories. In addition, the greater the local market for smart-grid products and services, the greater likelihood that cutting-edge innovation and manufacturing will remain in the region.

Winning the transition

Even in the Southeast, outdated fossil-fuel-based power, particularly coal-based generation, is in decline. So too is hands-on maintenance of aging infrastructure as it necessarily gets upgraded. At the same time, the utility-sector workforce is aging dramatically, with 45 percent of electric-utility engineers eligible for retirement by 2014 and nearly 30 percent of the faculty in the programs that train them scheduled to retire.[116]

In the absence of aggressive adoption of the next generation of technology and energy services, this decline could result in significant job loss across the region, as retiring workers in older technologies are simply not replaced. With an ambitious and comprehensive efficiency and smart grid strategy, however, jobs can be replaced across a range of skill levels and fields, enabling the Southeast to position itself to lead both in local job creation and in a rapidly growing but competitive global industry.

The efficiency opportunity

The smart grid is critical to building a modern energy infrastructure that uses limited resources effectively to deliver clean, high quality, affordable, and reliable power to a growing country and economy. But it is not sufficient. Traditional energy efficiency measures that ensure that households, commercial buildings, and industry have the design, equipment, and practices to cut energy waste and cut cost are also essential. Efficiency improvements can provide results rapidly and spur jobs in mainstream manufacturing, construction, installation, and repair, which complement the mostly high-tech jobs in the emerging smart-grid sector. Together they provide a critical opportunity to capture jobs for the future in a transitioning industry and labor market.

But where the Southeast is an emerging leader in smart grid, it lags in traditional efficiency. The region relies more heavily on fossil fuels than the national average, uses more energy per capita, and lags in adoption of most energy efficiency policies. In addition, the region's population and energy use per capita is growing more rapidly than the nation as a whole.[117] In 2009 the Southeast used 20 percent more electricity per capita than the national average, and the larger 16-state southern Census region was on a trajectory to increase residential, commercial, and industrial energy consumption by 16 percent over 20 years.[118] But this position as a regional energy efficiency laggard also means the Southeast boasts disproportionate opportunity to become a leader. A 2009 McKinsey study found that 41 percent of the nation's cost-effective efficiency improvements could be found in the Southeast, Texas, and Oklahoma.[119]

The American Council on an Energy Efficiency Economy, a leading energy efficiency advocacy and research organization, found in its 2011 annual survey of state energy efficiency policies and actions that no southern state made it into the top 10, and that three of these states fell into the bottom 10.[120] Few southeastern states have Energy Efficiency Resource Standards requiring utilities to increase efficiency adoption, and many also lag in implementing other common efficiency policies.[121] But some progress has been made in recent years: Tennessee, Florida, and North Carolina were ranked by the American Council on an Energy Efficiency Economy near the middle of the pack nationally, making them potential leaders in the region. Alabama and Tennessee were cited by the council among the "most improved" states for their adoption of building codes. Tennessee was also cited for incentives for high efficiency vehicles.[122]

Tackling the efficiency challenge can bring major economic returns

In an in-depth study of efficiency opportunities across the 16-state southern Census region, Georgia Tech and Duke University modeled the impact of policies used in other states that showed the potential to cut overall energy use in homes, commercial buildings, and industries by 16 percent in 2030 relative to projections. Applied to these southern states, this would essentially keep energy use at current levels, even as the population and economy of the region grow.[123]

This increased efficiency would result in major economic benefits for the region. Consumers would save $41 billion annually in 2020 and $71 billion annually in 2030 on their energy bills, relative to business as usual.[124] These savings occur because

consumers use less energy and because lower demand necessitates fewer ratepayer-financed power plants be built. This in turn means 13 percent to 17 percent lower electricity rates relative to projections in 2030. The added efficiency also reduces carbon dioxide emissions and reduces water use for power plant cooling by 20 billion gallons in 2030, cutting projected growth in water use approximately in half.[125]

The Georgia Tech/Duke University report also estimates that the efficiency gains will further boost the region's economy by increasing employment by 380,000 jobs in 2020 and 520,000 jobs in 2030.[126] These jobs result both from direct investment in the retrofits, audits, plant upgrades, and equipment needed to achieve the efficiency reductions and from shifts in spending, as households and businesses save on energy and use those savings for other needs.

Estimated economic impact of energy efficiency in the South

Efficiency offers a significant opportunity to create jobs and major economic benefits across the 16-state south Census region

	Employment gains	Annual consumer savings
2020	380,000	$41 Billion
2030	520,000	$71 Billion

Source: Georgia Tech/Duke University

The economic benefits of energy efficiency are not only a general stimulus to the economy of the region, which lags behind the rest of the nation economically.[127] They also can help better position the region's energy and manufacturing infrastructure, supply chain, and skills base for the future. Moving beyond sole reliance on traditional baseload power plants that risk becoming redundant as the industry changes, these states can incubate a more diverse set of labor-intensive industries and jobs in efficient-product manufacturing and services.

The auditing, repair, installation, and maintenance that goes into upgrading the efficiency of homes, businesses, and industrial facilities must be performed locally to those facilities. Put simply, you can't export a building to China to have it retrofitted. The building and electrical materials and equipment associated with efficiency improvements are very likely to be "made in America," as well.[128] In general, both goods and services for end-use efficiency tend to be significantly more labor intensive and also more local than those associated with traditional baseload power plants.[129]

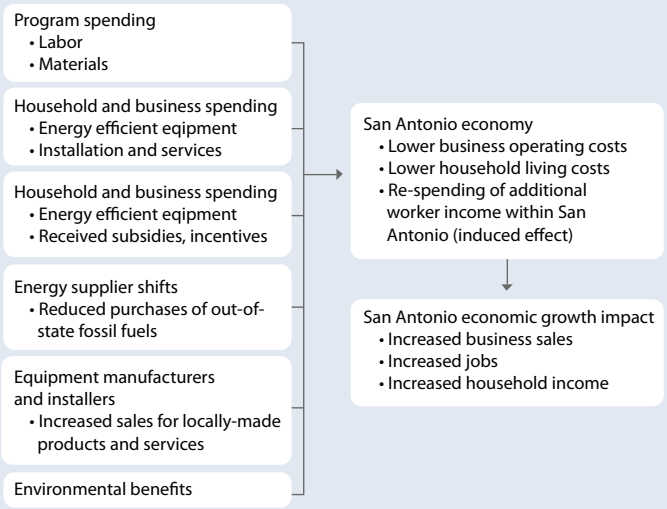
In addition to local job creation across a region with a disproportionate number of families living in poverty, efficiency programs can also help low-income residents in specific communities directly. Case in point: A 2009 report co-authored by the World Resources Institute and Southface Energy Institute highlights Virginia's creative use

San Antonio: Capturing the benefits of energy efficiency

For individual states or cities, the optimal mix of efficiency policies will vary depending on that area's current energy portfolio, housing stock, and industrial base. The opportunities to align that energy policy with local economic development strategies will vary, as well. An analysis done in 2005 for San Antonio (see below) provides a glimpse of how one municipal utility in neighboring Texas thought through the benefits of enhanced efficiency for its current and future economy.[130] San Antonio went on to implement robust energy efficiency measures and reap significant environmental and economic benefits as a result.[131]

Economic impacts of cost-effective energy efficiency

Energy efficiency programs' effect on San Antonio economy



Source: Economic Development Research Group

of the federal low-income housing tax credit to improve the energy efficiency of new low-income housing, cutting tenants' total monthly utility costs by 15 percent.[132]

Inspired by the potential to create jobs and boost consumer savings, states and communities across the Southeast are beginning to step up their energy efficiency efforts, some for the first time. Gov. Phil Bryant of Mississippi has made efficiency a priority of his new administration, and the state has just received a grant from the Department of Energy, matched with funds from the Tennessee Valley Authority, to enable its largest universities to cut energy consumption 20 percent by 2020—moves that the state hopes can spur energy reductions throughout the university system and state government.[133]

A number of the region's major utilities have also begun taking action on efficiency. The Tennessee Valley Authority—whose electric power serves not just Tennessee but significant parts of Mississippi, Alabama, Georgia, and Kentucky, as well—committed in 2008 to cutting peak demand by 4 percent by 2012 and Tennessee utilities reported at least twice the energy savings of most neighboring

states in 2009. In 2010 Arkansas was the first southeastern state to set an energy efficiency resource standard, and North Carolina also sets energy savings targets as part of the state's renewable energy and energy efficiency portfolio standard. Similarly, in the lead up to the merger of their parent companies, Duke Energy Carolinas and Progress Energy Carolinas committed to energy efficiency savings of 7 percent of retail sales between 2014 and 2018.[134]

Capturing the gains

Though critical first steps are being taken, challenges remain for the region to meet its efficiency potential. Approaches that help maximize economic and jobs benefits can help overcome political obstacles to policy change. New regulatory approaches can help reward rather than penalize utilities for enhanced efficiency that may reduce sales. Codes, incentives, and innovative financing mechanisms—such as on-bill financing, which allows consumers to pay back the cost of the initial energy retrofit through savings on their electric bills—can help persuade consumers to make efficiency investments. In addition, new benefits from the smart grid for utilities and consumers can help make efficiency improvements attractive in ways beyond the cost savings that have driven them so far.

Indeed, a few key actions can move the region forward in both traditional and next-generation efficiency and grid modernization. First, transforming infrastructure is hugely job creating but takes time and money. Clear state and federal policy frameworks—particularly those that set long-term efficiency and renewable energy goals—are critical to provide local demand and investment certainty for utilities, municipalities, and supply-chain manufacturers in emerging fields.

Second, major utilities in the Southeast are central and critical players in rapid efficiency and smart-grid deployment and have an opportunity to lead nationally. Whether looking at traditional efficiency or smart-grid implementation, there are opportunities to scale up from existing successes—whether that's learning from municipal utilities such as Austin Energy or from the Department of Energy Smart Grid pilots, extending the Tennessee Valley Authority's efforts to neighboring utilities or Duke Energy's smart grid and efficiency engagement across its new and even larger footprint. Mechanisms that better align utilities' business models, profitability, and the regulatory framework that supports it with objectives other than increasing the quantity of power sold—e.g., with efficiency—are particularly important.

Finally, innovation, implementation, and economic development are mutually reinforcing. Whether through state and federal policy or other, more local mixes of energy and economic development actions, the region must commit not just to policy pilots or technology innovation but also to large-scale implementation of efficiency and smart grid in the region. In a competitive global industry, we cannot rely on domestic innovation translating into domestic job creation throughout the supply chain unless we have a robust market at home. It is becoming increasingly clear that high-tech, high-value-added manufacturing drives robust innovation, research, and development as much as the reverse. Latecomers will still be able to capture the efficiency benefits of a new generation of energy technology and the jobs operating that technology—but will have access to far less of the very significant design, engineering, and manufacturing for a growing global market.

States, communities, companies, and utilities are innovating in the Southeast. A more concerted, coordinated effort to modernize and transform the electric sector through smart grid and efficiency has the potential to bring far cleaner energy to the region, as well as new jobs and much-needed economic revitalization. In addition, connecting energy innovation with other emerging sectors such as next generation vehicles, energy storage, consumer electronics, and information technology presents the opportunity for long-term economic growth and diversification. Basic efficiency gets waste out of our economy and puts money back in people's pockets today, while smart grid innovation adds high quality jobs, global competitiveness, and improved quality of life for the future.

Energy efficiency: An economic and environmental boon for every region

As we've argued throughout this report, different regions have different energy portfolios, needs, and potential resources. But while all energy is regional, energy efficiency is universal. Every region has buildings that use energy, so every region has the potential to be an energy efficiency leader that can bring down energy bills, create American jobs, and reduce reliance on fossil fuels as part of that bargain. Getting energy efficiency to scale at a local, regional, and national levels must be a lynchpin of any energy strategy. Here are the payoffs.

Saving money

American families cannot wait to save energy. The national average that a household pays for electricity has risen by $300 over the past five years and is now at $1,419 per year, which marks the longest sustained increase since the 1970s.[135] There are approximately 130 million homes in the United States, and roughly half were built before 1973—long before modern residential building codes and more widely used practices to insulate against energy waste were put in place.[136]

McKinsey and Co. finds that our nation wastes a combined $130 billion annually on energy costs from inefficient buildings and appliances—costs that could be significantly reduced by using currently available but off-the-shelf technology.[137] Energy efficiency retrofits such as new insulation, better heating, ventilation and cooling systems, and new windows and siding can save families money on their energy bills—money that can and should be used for other needs, which would boost the regional economy.[138]

Creating jobs

Energy efficiency investments create local jobs in industries that desperately need them. The recent economic downturn resulted in high levels of unemployment in the construction and manufacturing sectors, which are two areas central to the energy efficiency industry.

Every $1 million invested in energy efficiency retrofits will create 17.36 jobs, according to the Political Economy Research Institute at the University of Massachusetts, Amherst. Compare that with the 6.86 jobs created by investment in the coal industry, or the 5.18 jobs if the same money were put in oil and gas. In fact, building retrofits outperform investments in new oil and gas exploration as a form of job creation or economic stimulus by a factor of 3-to-1.[139]

What's more, most of the products used in energy efficiency retrofits have more than 90 percent of the components made in the United States. Sheet metal for ductwork, for example, is more than 99 percent domestically sourced; vinyl windows are 98 percent American-made; and rigid foam insulation is made in America more than 95 percent of the time. Even major mechanical equipment such as furnaces (94 percent made in the United States) and air conditioning and heat pumps (82 percent American-made) have a much larger share of U.S. content than other products, with the domestic share of production for all products in the United States hovering just above 76 percent.[140] Finally, clean energy jobs are better for U.S. small businesses. In fact, 91 percent of firms that have upgraded are small businesses.[141]

Reducing dependence on fossil fuels

Buildings are the smartest place to begin reducing our dependence on fossil fuels and tackling climate change. They consume nearly 49 percent of all energy in the economy and emit nearly half of total carbon emissions.[142] That's more carbon dioxide than any other sector, including transportation.[143]

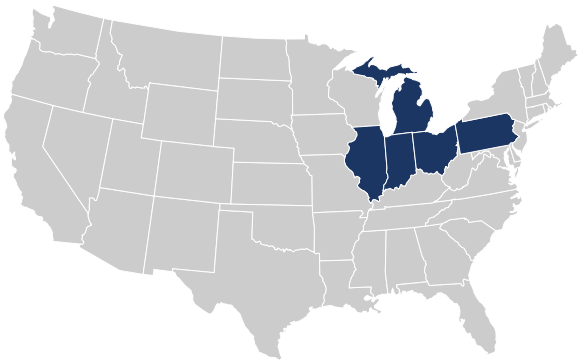
Most of the electricity that buildings consume—68 percent—comes from fossil fuels.[144] Increasing building efficiency can cut into this dependency by reducing electricity demand. With the business-as-usual projections for electricity demand relatively flat in the coming years,[145] implementing new efficiency measures will also reduce the need to build new energy generators or rely on dirty coal-fired power plants.

Moving forward

When it comes to retrofits, every building is its own physics problem. Finding the right suite of tools for a given region and climate are crucial to ensuring the maximum cost-savings ratio. In all regions, however, the economic and environmental case for retrofits is clear. Energy efficiency saves families money, creates jobs, and reduces dependence on fossil fuels.

Manufacturing the future in the industrial Midwest

By Zoe Lipman, National Wildlife Federation



The Midwest is undergoing an industrial transformation. Over the past 18 months, Toledo, Ohio, has seen more than $1 billion in investment by just three of the many recovering companies in the area. Chrysler Group, LLC, will invest $500 million and add 1,100 jobs to build a redesigned and more efficient replacement for the Jeep Liberty.[146] General Motors Co. is spending $200 million and adding 250 jobs to build fuel-saving 8-speed transmissions.[147] Johnson Controls, Inc., an industry leader in conventional automotive batteries, will invest $140 million to retain 400 jobs and add an additional 50 positions to build Absorbent Glass Mat batteries for stop-start systems.[148] This technology—which avoids idling and today enables hybrid cars to shut off at a stoplight and start again immediately when the accelerator is pressed—will soon be used in large numbers of conventional vehicles.[149]

Referring to these projects, among others, a Toledo economic development leader recently noted that, "It wasn't too many years ago that Toledo, Ohio, in any economic development statistic would have been listed as leading the race to the bottom. Now … we're helping to lead the recovery."[150]

Toledo is not alone. After decades of manufacturing and employment decline that gutted family- supporting jobs and communities across the industrial Midwest, many of the same cities are now seeing significant job growth, anchored by a revival in advanced clean vehicle innovation and manufacturing.

This industrial renaissance is built squarely on the notion that America leads when we are at the cutting edge of new technologies, at the same time as growing U.S.

and global demand for highly efficient and low-emission vehicles is creating a huge new market for those technologies. Our energy vision for the Midwest is one in which the region anchors national leadership on new and better technologies that boost energy security, reduce pollution, and tackle climate change—all while building American prosperity, creating long-lasting jobs, and fostering our global leadership in innovation.

In contrast, the American Petroleum Institute's vision for the Midwest is the drive to enhance production of one of the dirtiest fuels—Canadian heavy crude from the Alberta oil sands—and pipeline it to the Gulf of Mexico (or other ports) for refining and export. This approach does little for the region's consumers or economy, carries big risks to critical regional water resources, and undoes pollution reductions being achieved by Midwest industry.

Largely bypassing Midwest refineries, the proposed Keystone XL pipeline expansion would not lower, but would raise, fuel prices in the Midwest,[151] while threatening natural habitats and essential aquifers that water the nation's breadbasket. Similarly, another company, Enbridge Inc.—the company responsible for the nation's largest inland crude spill, which released more than 1 million gallons of tar sands crude into Michigan's Kalamazoo River in 2010[152]—is rapidly expanding pipeline capacity on its system in the upper Midwest and is seeking a route through the Midwest to the Maine coastline, destined for export.[153] At the end of the day, these strategies to expand reliance on the dirtiest fuels leave the Midwest with little more than risks and pipelines running through its backyard.

The worst environmental degradation from these projects is taking place in Canada, where tar sands production has destroyed vast swaths of the boreal forest, a critical ecosystem that supports billions of birds and iconic species such as woodland caribou, moose, and gray wolves. Not only is their habitat being bulldozed and fragmented at a rapid pace, but tar sands extraction is so energy intensive that the carbon pollution from producing and refining the fuel can be more than double that of conventional petroleum.[154] The carbon pollution from the oil carried by the Keystone XL pipeline would negate the pollution cuts made under new U.S. standards to improve fuel economy in medium and heavy-duty trucks.[155] In addition, pipelines such as Keystone XL effectively lock us into decades of reliance on this destructive fuel, limiting Americans' energy choices and potentially crowding out investments in cleaner fuels, including cleaner forms of conventional petroleum.

While the auto industry is proving that a modern, successful industry can take sustained, effective steps cut carbon pollution and oil dependence, a big new commitment to tar sands oil would directly undercut the gains from these improvements and would take the nation in the opposite direction.

Fundamentally, both visions are about oil. The major difference is that the American Petroleum Institute proposes putting the region's long-term prosperity, natural resources, and quality of life at risk for short-term profit in world oil markets, while our vision provides an alternative path away from economic dependence on oil and toward real relief from pain at the pump. It employs homegrown ingenuity and talent to rebuild our economy now and for the long term.

The automotive success story unfolding in the Midwest is not an accident. Instead, it is the result of a smart combination of public and private investment, together with effective environmental, technology, and economic policy working to drive innovation, enhance global competitiveness, and spur job growth at home.

Renaissance

Whether in car ads, dealerships, traffic, or their own driveway, Americans are seeing a transformation in the auto industry. Best-selling vehicles such as the Chevy Cruze are showing that U.S. automakers can build high-quality, high-efficiency, affordable small cars, while new pick-up trucks such as the Ford F150 (the nation's best-selling vehicle) are delivering huge improvements in fuel economy alongside greater power and performance.[156] Companies such as Ford Motor Co., Honda, and Toyota are not just offering hybrid cars but also are building more of those advanced vehicles and/or hybrid components in the United States, as well. The Chevy Volt had its best sales month yet in August, and seven different automakers offered electric and plug-in hybrid electric vehicles in 2011.[157]

Having recovered from near bankruptcy less than three years ago, the industry is now profitable, sales are rebounding,[158] and fuel economy improvements have exceeded projections. Encouraging sales figures show consumers welcoming the opportunity to move to more fuel-efficient vehicles across a wide range of vehicle types.

Behind every great new vehicle is a supply chain that includes hundreds (and fleetwide, thousands) of high-tech manufacturing, materials, and electronics companies. Automotive parts and assembly remains the largest single manufacturing

sector in America, employing about 800,000 people directly in manufacturing.[159] About 2.5 million Americans are directly employed in auto and parts manufacturing, sales, and service taken together,[160] while still more depend on the auto industry for their livelihood when indirect employment is taken into account.[161]

These jobs continue to grow. Retooling the auto industry to build the next generation of vehicles has proved to be one of the most effective elements of a national recovery, adding 236,000 direct jobs in manufacturing and auto sales since the low point of the recession in mid-2009.[162] That adds up to a 14 percent growth rate that has far outpaced the economy as a whole.

Today's auto industry connects innovation in traditional auto-supply sectors—such as steel, electronics, materials, and high-tech machinery—with innovation in the power sector, in information technology, and in consumer electronics.

Maintaining advanced clean vehicle leadership is essential for the nation as a whole. But for the industrial Midwest (as well as for states across the south, California, New York, and other communities with a deep manufacturing infrastructure, workforce, and history), it provides a key opportunity for revitalization, growth, and economic competitiveness. As countries and customers across the world move to use limited resources wisely, cut their spending on oil, and take seriously the commitment to reducing carbon emissions, the Midwest is poised to become a global leader.

How clean car and truck innovation works for the Midwest

The Midwest has a powerful base from which to supply U.S. and global demand for the next generation of transportation technology. In 2011 a study by the Natural Resources Defense Council, National Wildlife Federation, and the United Auto Workers, called "Supplying Ingenuity," identified more than 300 companies in 500 locations nationwide already making components or technology that specifically contribute to increasing fuel economy. These companies employ more than 150,000 workers in 43 states. In Michigan alone, 97 facilities employing 38,000 people make "clean car" parts or materials.[163] These jobs were found in huge so-called tier-one auto parts suppliers (those at the very top of the supply chain, supplying parts directly to the major auto companies), as well as in tiny start-ups; in "conventional" gas technologies such as turbochargers and in "new" auto technologies such as battery-grade lithium carbonate production.

Building successfully on this foundation wasn't inevitable. High-performance, high-efficiency components could have remained only a small part of the industry, serving niche customers such as the buyers of the Tesla luxury sports car. The industry could have also become split between traditional vehicle manufacturing and the "green" part of the industry, competing with one another for customers and market share. Instead, over the past few years we've seen smart policies that drive a domestic transformation of the industry as a whole, ensuring growth both in new technology and widespread integration of that technology into all segments of the fleet—turning one of our most basic industries green.

Smart policy is critical

The current turnaround would not have been possible without the hard work and innovation of hundreds of thousands of Americans nationwide and billions of dollars of public- and private-sector investment in America's manufacturing capacity. Equally critical is the framework of decisive environmental and energy policy coupled with economic development initiatives at the federal and state levels.

Most notably, after decades of inaction at the federal level, bipartisan support for a new direction for American vehicles emerged in the 2007 Energy Independence and Security Act, which tasked the U.S. Department of Transportation with setting far stronger and better-structured fuel economy standards. Building on this foundation, prompt and effective action by Department of Transportation and the Environmental Protection Agency resulted in groundbreaking standards to raise the fuel efficiency and meet requirements to cut carbon pollution from our cars and trucks. New fuel economy standards require the industry to double fuel economy in new vehicles from today's average levels of about 27 miles-per-gallon to a 54.5-miles-per-gallon average in 2025.[164] This means new cars, SUVs, and pickup trucks in 2025 will use about half the fuel those same vehicles use today. In 2011 the agencies also set the first-ever standards to improve fuel efficiency in medium and heavy trucks.

The new standards are sufficiently strong and sustained to drive significant innovation and provide the long-term certainty companies need to make large, capital-intensive investments. Unlike earlier standards, which rewarded companies for shifting to small cars, the new standards are structured to ensure fuel economy improvements across all types and sizes of vehicles. This not only means that consumers will see fuel savings no matter what size of vehicle they need, but it

also encourages industry innovation and investment across a far wider range of technologies and vehicles—creating large, long-term domestic markets for those who create this technology.[165]

While well-structured standards are essential to spurring domestic job growth in advanced vehicles, they are not necessarily sufficient to maximize those benefits. Fortunately, strong fuel economy standards have been coupled with economic development, research and development, and commercialization policies at local, state, and federal levels that help take full advantage of domestic potential—not just to innovate but also to create and grow businesses and to manufacture the high-tech advanced vehicles and technology the new market demands.

The federal Advanced Technology Vehicle Manufacturing Loan program, for example—also established in the Energy Independence and Security Act—leverages the existing manufacturing strength of the industrial Midwest and other manufacturing centers in the South and West, and has aided firms in those areas to retool their plants or build new ones to manufacture more fuel-efficient vehicles.[166] Loans to Ford alone facilitated investment in plants in five states and saved or added 33,000 jobs.[167] Similarly, the Advanced Research Projects Agency–Energy[168] and the Vehicles Technology Program[169] at the Department of Energy and our National Labs[170] have aided research, development, and commercialization programs across a wide range of advanced automotive, power, fuel, and manufacturing technologies have helped position small and large firms to meet the demands of a rapidly innovating supply chain.[171]

Auto industry revival putting the Midwest back to work

Clean-vehicle manufacturing and sales help drive down unemployment

	U.S. unemployment rate	Indiana unemployment rate	Michigan unemployment rate	Ohio unemployment rate
Oct-09	10	10.5	14.1	10.6
Jan-10	9.7	10.6	13.8	10.6
Jul-10	9.5	10	12.6	9.9
Jan-11	9.1	9	10.6	8.9
Jul-11	9.1	9.2	10.6	8.9
Jan-12	8.3	8.7	9	7.7
Jul-12	8.3	8.2	9	7.2

Source: Bureau of Labor Statistics

Rapidly improving technology means additional components and retooling, which in turn means additional jobs. A big U.S. market for globally competitive technologies means companies are onshoring investment and production of next-generation vehicles and technology both to serve the U.S. market and for export. Great automotive products drive strong sales, and strong sales drive jobs.

In a recent Consumer Reports survey, fuel economy ranked number one among attributes consumers seek in a new vehicle,[172] and recent evidence suggests that providing better, more fuel-efficient (and money-saving) options in every vehicle segment is driving sales growth.[173] Making the most efficient vehicles here means that as consumers respond to rising and volatile gas prices by moving to more fuel-efficient vehicles, those purchases will boost U.S. jobs in factories and dealerships rather than deserting them.

In its 2012 report, "How Fuel Efficiency is Driving Job Growth in the U.S. Auto Industry," the project Driving Growth highlights dozens of recent new plant, technology, and job announcements in the Midwest.[174] These stories provide a vivid sense of how a shift to more fuel-efficient technology translates directly into job growth in the region. These stories range from added manufacturing and construction jobs as steel and components companies add plants and lines for innovative new products, to added shifts to keep up with demand for more efficient engines for pickup trucks and SUVs, to investments to boost hybrid-vehicle production in the United States for export worldwide. Taken together, the results are impressive.

Over the past two and a half years, the recovery in the auto industry significantly outpaced recovery in the economy as a whole and had an even more disproportionately positive impact in manufacturing states. Auto industry employment has grown nationwide by 14.5 percent (26 percent in manufacturing and 7 percent in sales) since the low point of the auto crisis and recession. Auto industry job growth in manufacturing states has been even faster and large enough to make a significant impact on statewide employment outcomes.[175]

As of July 2012, Michigan had added 35,000 automotive jobs—half of total job growth in the state—and experienced a drop in statewide unemployment to 9 percent from 14.1 percent in 2009. Ohio added 11,000 automotive jobs—a quarter of total job growth—and saw unemployment drop by 3.4 percent, to 7.2 percent in July 2012, which was significantly below the U.S. average of 8.2 percent. Indiana has added 20,000 auto-sector jobs—a third of total job growth—and has seen statewide unemployment drop to 8 percent from nearly 11 percent. Though progress still needs to be made, the significant gains made in the past three years provide a roadmap for continued success.

Sustaining clean vehicle leadership for the future

The current turnaround is underscoring how innovation and manufacturing leadership go hand in hand. While leading U.S. research and development has all too often ended up underwriting industrial growth overseas, the advanced manufacturing revival in the auto sector is boosting domestic research and development, putting cutting edge, publicly funded research to work and attracting foreign investment not just in production but also in innovation.

Ford recently said the company had doubled—to 1,000—the number of engineers working on hybrid, electric, and other advanced fuel efficiency at its Advanced Engineering Center in Dearborn, Michigan.[176] Meanwhile, Honda wowed auto shows this past winter with the Acura NSX, a hybrid supercar—and with the surprise that it would be developed and made in Ohio.[177] Michigan and California have alternately led in receipt of clean energy patents over the past several years, while General Motors and other auto companies also regularly lead those rankings.[178] Sustaining this virtuous cycle requires both an ongoing commitment to manufacturing and to innovation.

Midwest and U.S. leadership in electric vehicle technology is a critical part of this story. While the bulk of vehicles built to meet high fuel-economy targets will be advanced gasoline and hybrid vehicles, electric vehicle innovation in materials, batteries, electric motors, and controls serves to speed advances across the supply chain.

Further, electric vehicles provide a means to ensure a U.S. technological foothold in critical areas of future transformation of the auto sector. Electric vehicles provide high-performance driving nearly or entirely without gasoline or any liquid fuel. They enable drivers to power their vehicles at home, with stable, domestic, and increasingly clean electricity that costs the equivalent of about a dollar per gallon.[179] They enable customers to connect their cars with mobile and smart-grid home or business energy-management systems, creating the potential for new consumer benefits and business opportunities.

Our leadership stake to date is paying dividends. In 2010 General Motors was the first to market the plug-in hybrid electric Chevy Volt built in Michigan, joined by the all-electric Nissan Leaf, soon to be manufactured in Tennessee.[180] Through July of this year, Volt sales were up nearly 300 percent compared to the same time in 2011.[181] Despite ongoing politically motivated attacks on electric vehicles, the industry continues to grow and automakers continue to see the potential of electric vehicle technology; in coming years, consumers will be able to choose from electric models from nearly every automaker. In their first year, the Volt and the Leaf sold more strongly than the Toyota Prius—the first hybrid car—did in its first year. Ten years later, hybrid technology is now commonplace.

The Midwest is a significant player in many aspects of this technology: batteries, electric motors, hybrid and electric drivetrains, and electric-vehicle assembly. But our competitors, chiefly in Asia, are rapidly implementing their own strong policy and financing packages intended to capture this market. As a result, the region needs to stay the course if it is to continue to reap the benefits of cutting-edge vehicle innovation across the supply chain. No cutting-edge field is without risk, but the biggest risk for our future economy is to leave the field open to others.

Trading pain at the pump for still more jobs at home

Leadership in producing the next generation of highly efficient transportation technology provides a powerful opportunity for the Midwest industrial region, built on advanced technology, advanced manufacturing growth, and rapid job cre-

ation. But jobs in the auto industry and its supply chain are only part of the story. The broader economic impact of oil savings is equally great.

Improvements on light and heavy-duty car and truck fuel economy are the largest step ever taken to cut oil use—equivalent to 3.1 million barrels per day by 2030, or more than all the oil we currently import from Saudi Arabia, Venezuela, and Russia. This means big savings to households and businesses. Relative to the average vehicle today, a family that buys a new car in 2025 will save $8,000 over the life of that vehicle—even after taking into account the modest increased cost of new technology. Americans will save $1.7 trillion at the pump over the life of the more fuel-efficient vehicles built between 2012 and 2025. That's a net savings of about $140 billion a year in 2030.[182]

Two recent studies—by the investor group Ceres[183] and by the Blue Green Alliance—each found that the new fuel economy standards would drive the growth of an additional half a million jobs, relative to business as usual. The Blue Green Alliance found that the move to more fuel-efficient vehicles would add 570,000 jobs across our economy as families and businesses spend the money they save on fuel (much of which would otherwise flow overseas) on local goods and services.[184]

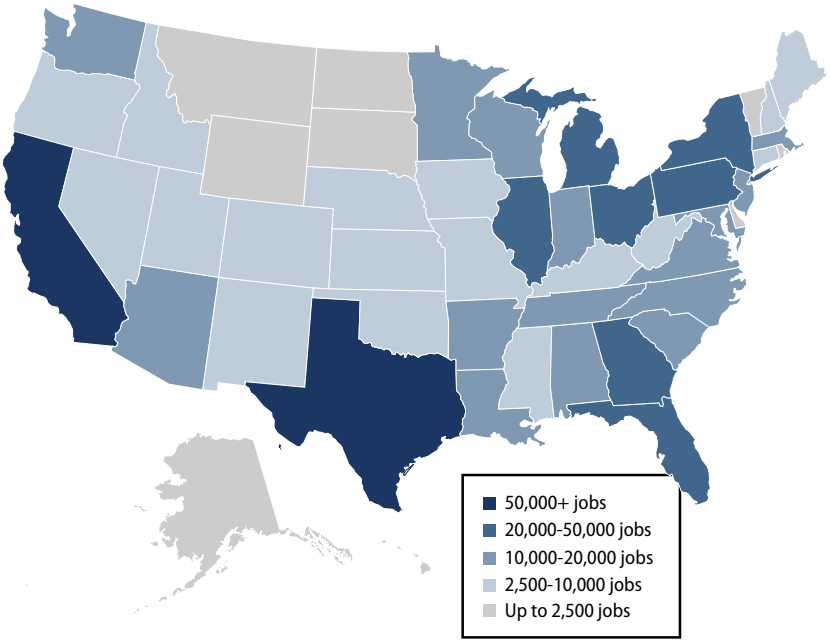
For the industrial Midwest states of Michigan, Ohio, Indiana, Pennsylvania, and Illinois, the latest round of standards alone mean projected net consumer savings of $6 billion a year by 2030—money that families and businesses can then spend in the local economy.[185] The standards would also add 95,000 jobs across these states.

Far more efficient vehicles also insulate families and businesses from the risk of volatile oil prices and take the pressure off the rush to find new, often risky or dangerous sources of supply. These new efficient vehicles will result in the largest step the United States has ever taken to cut the carbon pollution that causes climate change—reducing carbon pollution by nearly 600 million metric tons in 2030, or nearly 10 percent of total U.S. carbon pollution from all sources today.[186]

The auto story clearly demonstrates that American businesses can address climate change in a way that spurs innovation and makes us more—not less—competitive, while improving our health, livelihoods, and natural world at the same time.

Fuel efficiency means major savings, job growth nationwide

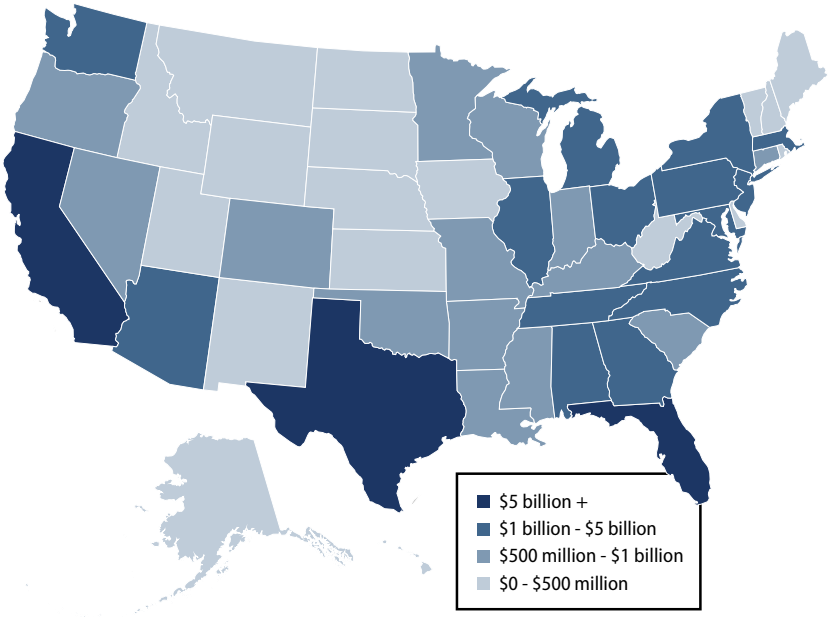
State job gains by 2030 from improving fuel efficiency



Source: Natural Resources Defense Council; BlueGreen Alliance

Driving the economy with investment in fuel efficiency

Annual net consumer fuel savings in 2030 dollars from improving fuel efficiency*



*Net Savings equals fuel savings minus incremental cost of fuel-saving technologies

Source: Natural Resources Defense Council; BlueGreen Alliance

Looking forward

The Midwest is a key player in the American manufacturing economy, but it's also key to our energy future. We could see this region only as an energy consumer or as a place only valuable to extract or pipeline fossil fuel resources.

But the region is more than that. It is the key to a long-term strategy to innovate and use less oil and fewer natural resources in meeting our household and business objectives, while simultaneously diversifying and strengthening the national economy. At the same time this strategy can protect communities, natural resources, and the Great Lakes for future prosperity and quality of life.

Ensuring that the Midwest remains a global leader in fuel-efficient and advanced vehicles will result in job growth, consumer savings, greater competitiveness, and synergy with global markets. The auto success story demonstrates that the American industry can achieve dramatic cuts in oil demand and carbon pollution while building world-beating products and improving careers and quality of life. Indeed, these fuel cuts are so deep that they make it clearly feasible to achieve domestic energy security without increased reliance on Canadian tar sands or other extreme fuels that pose real economic and environmental risks to the region.

This circle of economic and job growth, decreased dependence on costly and risky fossil fuels, and enhanced innovation and competitiveness is critical to the future of the Midwest and other manufacturing regions of the country. It's not a pipe dream. We not only know how to get there—we are already on the way. The combination of forward-looking standards, investment in domestic advanced manufacturing, and innovation provides a model for revitalization of other core industries through the kind of green renaissance that is working in the auto industry today.

Iowa: Heartland of the clean economy

American wind power is one of the pillars of our clean energy success story. It is not only creating jobs while spurring one of the country's largest manufacturing industries, but it is also providing clean, affordable electricity all across the country. Nationally, wind power represented a remarkable 32 percent of all new electric capacity additions in America in 2011—and leading our nation in the development of wind energy is the Midwest.[187]

Harnessing clean natural resources—specifically wind—in the Midwest has led to substantial economic growth, reduced carbon emissions, and decreased dependence on fossil fuels, all of which is much more beneficial than following the American Petroleum Institute's "drill, baby, drill" plan for this region. Iowa is now one of the country's largest and fastest-growing wind markets. According to the 2011 Wind Technologies Market Report, Iowa installed 647 megawatts of new wind capacity in 2011, bringing its total to 4,300 megawatts.[188] That is enough capacity to power about 1 million homes. This growth in wind capacity allows Iowa to generate 20 percent of its electricity from wind.[189]

But installed wind energy capacity in Iowa only tells part of the story. During one of the largest recessions in American history, embracing the potential of clean energy helped Iowa diversify its economy and create jobs of the future. Newton, Iowa, is a prime example: For 115 years, Newton was headquarters of the Maytag Corporation, the appliance maker that once employed nearly one-quarter of the town before closing its doors in 2006. A year later, with help from the state and federal government, Newton attracted the turbine blade manufacturer TPI Composites, Inc., and the wind tower producer Trinity Structural Towers, Inc., leading to the creation of 950 manufacturing jobs. Operations of the wind towers even opened in the old Maytag plant.[190] "Wind is about jobs for us," says Newton Mayor Chaz Allen. Iowa currently has up to 7,000 jobs in the wind industry.[191]

Over the past three decades, Iowa generated nearly $5 billion in private investments in the wind industry.[192] The federal production tax credit that provides wind farm owners with 2.2 cents per kilowatt-hour of electricity stimulated the midwestern wind market, but it is set to expire at the end of 2012. According to the American Wind Energy Association, since the start of the federal credit, the wind industry has decreased installation costs by 90 percent.[193] Failing to extend the production tax credit would result in the loss of 37,000 American jobs and would halt the progress of the country's clean energy economy.

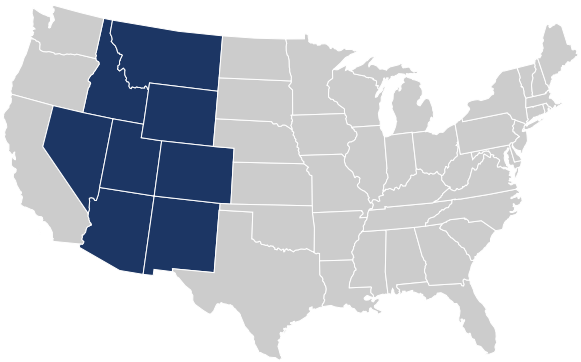
Facing the threat of this tax credit expiring, wind project developers have already become hesitant in planning future U.S. projects, and jobs are evaporating.[194] This is causing politicians—especially in Iowa—to urge Congress to extend this critical tax credit.

Sen. Chuck Grassley (R-IA) supports the extension of the production tax credit while calling the credit "successful in developing clean, renewable, domestically produced wind energy and the jobs that go along with it."[195] He and other senators from both parties have argued for a floor vote to extend it.

In contrast, the American Petroleum Institute's vision for the vast middle of the country centers around building the Keystone XL pipeline to transport 830,000 barrels of dirty Canadian oil across the Great Plains to refineries in Texas and Oklahoma, and exploiting coal and shale gas resources across large sections of the Midwest. While the American Petroleum Institute's plan overlooks Iowa completely, we see the state as a true leader in an emerging industry. The success of the wind industry in Iowa shows how a region's existing resources and skillset can be used to pave the way for a brighter economic and environmental future built on clean energy. That progress must be allowed to continue.

Gathering energy from sun, wind, and earth in the Mountain West

By Tom Kenworthy, Center for American Progress



The American Petroleum Institute's energy prescription for the Mountain West—Montana, Idaho, Wyoming, Utah, Nevada, Colorado, New Mexico, and Arizona—amounts to little more than the familiar and fatuous slogan, "drill, baby, drill." The trade association's recent report, "American Made Energy," includes a vague, broad-brush call for "the federal government to increase lease sales and adopt pro-access processes to improve development of U.S. oil and natural gas resources on public lands."[196]

This simplistic approach ignores several fundamental realities:

- The West is already experiencing serious damage from climate change and would face an even grimmer future if the nation turns its back on clean renewable energy in favor of a continued reliance on dirty fuels.
- The West boasts nearly unlimited renewable energy resources, particularly wind, solar, and geothermal, that promise a brighter economic future than is possible with fossil fuels.
- The oil and gas industry already has access to and holds leases on vast areas of western public lands that energy companies have yet to develop.
- Unbridled fossil fuel energy development would undermine the region's economic and social foundations.

Let's look at each of these realities in turn to demonstrate why the Mountain West—and the rest of the country—needs to tackle climate change and why the region is uniquely positioned to do so.

Human-induced climate change well underway

Climate change is not an abstract worry in the Mountain West. It is reality. Three years ago the authoritative report on U.S. climate change impacts prepared by the U.S. Global Change Research Program declared unequivocally that, "human-induced climate change appears to be well underway in the Southwest."[197] The report also predicted the Mountain West will be one of the hardest-hit regions in the United States as climate change accelerates in coming years.

This year's catastrophic wildfires, continued widespread drought, declining winter snowpack, and earlier-than-usual melting and runoff of snow that sustains the region's rivers and supports tens of millions of people, are all evidence of fundamental changes underway that will have major disruptive effects on the West's economy and way of life. For the West, a business-as-usual energy strategy that treats the region as one big mining and drilling camp is foolhardy.

In this sprawling region that stretches from Montana to Arizona, the climactic conditions vary widely. The eastern parts of Montana, Wyoming, and Colorado are similar to the Great Plains; northern Idaho and western Montana are more northwestern; and Arizona, Utah, Nevada, and much of Colorado and New Mexico are part of the desert southwest.

The major consequences of climate change in the Mountain West include:

- In southwestern subregion states, droughts will become more severe; snowpack that is a critical source of water for tens of millions of people will decline; and competition for water among users will increase, as water shortages become more common in what has become the fastest-growing region in the United States. As the U.S. Global Change Research Program noted, "Water is, quite literally, the lifeblood of the Southwest ... Water supplies in some areas of the Southwest are already becoming limited, and this trend toward scarcity is likely to be a harbinger of future water shortages."[198] A 2011 report by the Department of the Interior predicts annual water flows in three of the West's biggest rivers—the Colorado, the Rio Grande, and the San Joaquin—could fall by as much as 8 percent to 14 percent.[199]

- In the Northwestern subregion, water supplies will be strained, as higher temperatures cause more precipitation in the form of rain instead of the snow that the region depends on to provide water for uses ranging from municipal and industrial to agricultural irrigation and hydropower. Snowpack is expected to decline by as much as 40 percent. The risk of forest wildfires will increase, as will the impacts of the mountain pine beetle and other insect outbreaks affecting forests.

- In the Great Plains subregion, "more frequent extreme events such as heat waves, drought, and heavy rainfall will affect many aspects of life in the Great Plains. Agriculture, ranching and natural lands, already under pressure due to an increasingly limited water supply, are very likely to also be stressed by rising temperatures," according to the U.S. Global Change Research Program.[200]

The economic consequences of these climatic changes are likely to be severe. In 2008 the National Conference of State Legislatures and the University of Maryland's Center for Integrative Environmental Research examined the economic costs associated with global warming in a number of states, including Nevada and Colorado. In Nevada the study found that, "Water limitations could affect tourism, real estate development and human health and could result in the loss of billions of dollars."[201] The golf industry alone could lose nearly $200 million a year and shed more than 1,100 jobs. In Colorado the study predicted major impacts on tourism, particularly the state's skiing industry. A 1-percent decline in the number of tourists coming to Colorado would mean an economic loss of more than $375 million by 2017 and the loss of more than 4,500 jobs. Agriculture is also expected to be hit hard.

The Mountain West's energy future rests on clean, renewable energy

Blessed with abundant sun, wind, and geothermal resources, the states of the Mountain West have some of the best renewable energy potential in our nation. The region is, in many respects, leading the way in developing that potential. This vast opportunity for a transition to clean, abundant, and inexhaustible energy is enhanced by the fact that the federal government owns so much of the land base in the West that it can drive this transition. If renewable energy development on federal lands is done responsibly—with care taken to protect areas that are important for recreation, wildlife habitat, archaeological sites, and other public values—then this new use for the public estate will win wide acceptance.

Powering the future in the Mountain West region

Renewable energy projects are creating jobs now and into the future

Solar, wind, and geothermal projects

Existing capacity	5,444 MW
Planned projects	6,344 MW
Total projects	**11,788 MW**
Total jobs created	**71,872**

*Job creation varies depending on specific project.

Source: Electric Power Research Institute, National Renewable Energy Laboratory

The abundance of renewable energy resources in the West promises a thriving economic sector that provides abundant electric power, as well as billions of dollars for the economies of the Mountain West states and hundreds of thousands of new jobs. Currently in the eight states of the Mountain West, there are online wind projects with a capacity of more than 5,300 megawatts. According to the American Wind Energy Association, proposed projects for those states would provide more than 53,000 additional megawatts.

Three western states—New Mexico, Wyoming, and Montana—rank among the top 10 states for available wind resources. In fact, every state in the region, with the exception of Arizona, could provide all of its own current electricity needs with wind power, and two—Montana and Wyoming—could provide more than 100 times their current electricity needs.

The federal Bureau of Land Management (a Department of the Interior agency) has done extensive analyses of the potential for renewable energy in western states. The agency's wind study predicts that the eight Mountain West states could be producing another 8,604 megawatts of electricity by 2025. Its geothermal study sees potential geothermal production of 5,540 megawatts in those same states by 2025. And its solar study, which covered California, Arizona, Utah, Colorado, Nevada, and New Mexico, predicts the potential for more than 31,000 megawatts by 2030. The Bureau of Land Management has already permitted 16 utility-scale solar projects on its lands that will produce 6,000 megawatts.

A study published earlier this year by the National Renewable Energy Laboratory looked at the potential for renewable energy in western states in a different way.[202] The study compared existing nonhydro renewable energy capacity and planned nonhydro renewable energy projects—either under construction or in advanced development—with what is required by 2020 according to individual state renewable energy standards. (Utah, Idaho, and Wyoming do not have renewable energy standards requirements.)

Existing capacity in the eight Mountain West states as of December 2011 was 5,444 megawatts. Planned projects in those states totaled another 6,344 mega-

watts. The total of existing and planned projects is 11,788 megawatts—well in excess of the Mountain West states' renewable energy standards requirements in 2020, which total (by a midrange estimate of capacity factor) 6,419 megawatts.

The National Renewable Energy Laboratory study did not break down projects by type of renewable energy. But if we assume that roughly the same ratios apply as are in the reasonably foreseeable development scenarios used by the Bureau of Land Management (69 percent of megawatts developed will be solar, 8 percent wind, and 23 percent geothermal), it is possible to make rough estimates regarding the jobs that are or will be created by a combination of existing capacity and planned projects.

Thus, of the total of 11,788 megawatts existing now or planned, 8,134 megawatts would be solar, 943 megawatts would be wind, and 2,711 megawatts would be geothermal. The job totals using the Electric Power Research Institute estimates of jobs per megawatt would thus be 53,684 jobs in the solar sector, 2,735 jobs in the wind sector, and 15,453 jobs in the geothermal sector—for a grand total of 71,872 jobs.

Industry complains about access but sits on idle leases

A pillar of the oil and gas industry's "American Made Energy" campaign is expanding oil and gas production on federal lands. In service of that goal, the industry relentlessly promotes a false narrative that government agencies and environmentalists are blocking access to rich deposits of oil and gas underneath the 700 million acres of western public lands and private and Indian lands where the Bureau of Land Management administers mineral leasing.

In her testimony on August 2, 2012, before the House Energy and Commerce Committee's subcommittee on energy and power, for example, Kathleen Sgamma of the Western Energy Alliance repeated the oft-stated claim that, "federal government policies and additional bureaucracy make it extremely difficult to operate on public lands."[203] These barriers, Sgamma said, prevent "small businesses from producing oil and natural gas, creating jobs, stimulating the economy, and returning revenue to the American taxpayer."[204]

The inconvenient truth that the oil and gas industry overlooks is that energy companies have access to and leases on millions of acres of public lands that they have not yet developed. What's more, the Obama administration has made it a priority

to increase oil and gas production from onshore lands that are fully managed by the federal government, as well as on private lands where the federal government holds the subsurface mineral rights.

Here are the facts:

- Nearly 21 million acres of public land that are under lease in the lower 48 states are sitting idle, neither producing oil and gas nor being explored for oil and gas by the industry. Those 21 million acres are more than half (56 percent) of the total acreage of public lands under lease to the industry.[205]

- In 2011 the Department of the Interior offered for lease nearly 4.4 million acres of public lands in 1,755 parcels. Almost 1,300 of those parcels were actually leased by the industry, and those lease sales brought in $256 million in revenue, up about 20 percent from 2010.[206]

- In fiscal year 2011 public lands and Indian lands, where the minerals are managed by the Bureau of Land Management, produced 117 million barrels of oil and almost 3 trillion cubic feet of natural gas. Gas production from 2009 to 2011 was 6 percent higher than the final two years of the previous administration. In 2011 the bureau held three of the largest five lease sales in its history. As The New York Times noted in a recent story about energy production from public lands and the bureau's role, "The score card shows that the industry is winning."[207]

- Public lands and publicly owned offshore waters yield about 30 percent of the oil, 20 percent of the natural gas, and 45 percent of the coal produced in the United States.

Fossil fuels and the Mountain West's true economic strengths

To say that the future of the Mountain West should not include fossil fuel development is wrong; fossil fuels are an important piece of the region's energy mix. The development of oil, gas, and coal deposits is an appropriate and an economically important use of public lands in the West. The critical questions that are not always easily answered are where development is appropriate and where other, less disruptive land uses should prevail; how intense the development should be in those areas where it is appropriate; and how the harmful impacts of energy development can be mitigated.

Unrestrained fossil fuel development on western federal lands with little regard for other important uses of those lands—among them hunting, fishing, other recreational pursuits, clean water and air, and wildlife habitat—would pose a grave threat to western economies, the social fabric that binds communities, and natural resources and amenities that have fueled growth and sustained attractive lifestyles in the region. Maintaining a large and varied system of relatively unspoiled public lands is, quite simply, critical to the West's future.

In a letter to President Barack Obama in November 2011, more than 100 economists and academics called for more protected federal parks, wilderness, and monuments. "[F]ederal protected public lands are essential to the West's economic future," the letter said, before continuing:

> *These public lands, including national parks, wilderness areas and national monuments, attract innovative companies and workers, and are an essential component of the region's competitive advantage ... The rivers, lakes, canyons and mountains found on public lands serve as a unique and compelling backdrop that has helped to transform the western economy from a dependence on resource extractive industries to growth from in-migration, tourism and modern economy sectors such as finance, engineering, software development, insurance and health care.*[208]

The economists' letter reflects a growing consensus, bolstered by research, that the economic vitality of the West is tied directly to protected public lands.

Earlier this year Headwaters Economics, an independent research group based in Montana, looked at the economies of several western states and the role of protected lands. That study found that from 1970 to 2010, nonmetropolitan counties in the West that had more than 30 percent protected federal lands increased jobs by 345 percent. Nonmetropolitan counties with no protected federal lands saw jobs grow by just 83 percent.[209]

In three states—Montana, New Mexico, and Colorado—the overwhelming majority of new jobs created between 2000 and 2010 were in service-related industries. Mining jobs, which includes oil and gas, made up just 1 percent to 2 percent of overall employment in the three states.

"Colorado's prosperity depends on protecting the natural environment that is part of our special quality of life," said University of Colorado economist Daphne

Greenwood as part of that study. "Protected public lands play an important role by providing recreational opportunities, wildlife habitat, and amenities that attract and keep creative people in Colorado."

A report issued this year by the Department of the Interior on the economic contributions of the lands it manages found that in fiscal year 2011, there were 435 million visits to the department's properties, and that recreation and tourism supported more than 403,000 jobs, generating nearly $49 billion in economic activity. In a broader look at the recreation economy beyond just federal lands, the Outdoor Industry Association found that outdoor recreation generates $646 billion in economic activity and supports 6.1 million jobs in the United States—or nearly three times as many jobs as the oil and gas industry.[210]

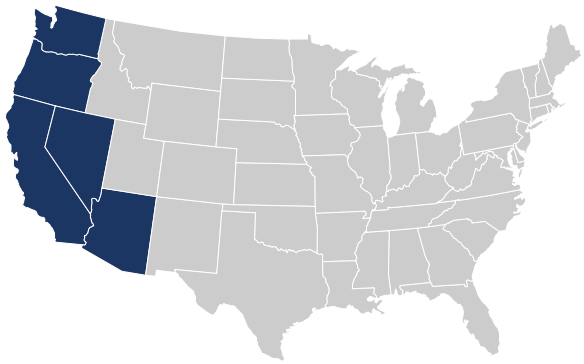
Voters, too, see protected public lands as economically valuable. In a survey this year of residents in six Mountain West states, the Colorado College State of the Rockies Conservation in the West poll found that between 85 percent and 97 percent of respondents agree that national parks, forests, monuments, and wildlife areas are an "essential part" of their states' economies.[211]

In a particularly telling response, 69 percent of those surveyed agreed with the statement, "We should not allow private companies to develop our public lands when their doing so would limit the public's enjoyment of—or access to—these lands."

The same Colorado College poll also demonstrated clearly that westerners who are intimately familiar with traditional energy extraction share our vision of the future. Unlike the fatally flawed prescription offered by the fossil fuel industries of vastly expanded development of oil, gas, and coal, our vision and that of sensible westerners is of a prosperous and healthy future built on clean and renewable sources of energy. When carefully developed, those new and inexhaustible fuels will support and sustain robust local and regional economies while protecting the public land resources that shape personal and community life throughout the West.

Innovating and installing solar energy on the Pacific Coast and beyond

By Kate Gordon and Calvin Johnson, The Center for the Next Generation



The Pacific Coast and the adjoining western states are famous for their diversity of industry—from Hollywood to Silicon Valley to the farmland of the Central Valley, and beyond—as well as the beauty of their natural landscapes. But to the American Petroleum Institute, the Pacific Coast is only one thing: a giant oil well. Its plan calls for opening up the Pacific Outer Continental Shelf for oil and gas drilling and easing permitting for onshore drilling on public lands. Our vision for this part of the country, on the other hand, builds on the strengths of these states, as well as on the remarkable steps already being taken to establish the region as a national leader in the emerging clean economy.

Recovering oil and natural gas from the Pacific Coast has historically been one piece of this region's energy economy—but it's not and should not be the only one. A dramatic expansion of offshore drilling would threaten the region's robust coastal economy. The natural resources of the Pacific Coast support jobs in multiple industries—including fishing, shipping, tourism, and recreation—in California, Oregon, and Washington. Opening new waters to offshore drilling would undermine the diversity of the current ocean economy, and an oil spill could easily wash away the 570,000 jobs and $34 billion of annual revenue currently supported by these industries.[212]

There's another onshore energy source that's sweeping the region, providing jobs, spurring new industries, and spawning new innovative technologies: solar. The West has a lot of sun, and solar energy is spreading across California, Nevada, and Arizona. Aggressive renewable energy standards coupled with tremendous solar

resources in California, Arizona, and Nevada place the Pacific Coast region in a strong position to build upon its current position as a national leader in solar energy installation and generation. California's far-reaching climate policies will only strengthen the state's position as a solar leader in the region. The aggressive renewable energy standards plus the cap-and-trade program are expected to spur increasing levels of clean-tech investment in solar technology, bringing to market new process and product innovations that will drive efficiency gains and cost reductions.

California is the leader in this region and the "anchor tenant," in a way, in terms of solar innovation and production. Many of the projects have been huge solar arrays—infrastructure projects that create thousands of high-quality local production and construction jobs. Through the first quarter of 2012, California has installed 2025 megawatts of solar energy capacity.[213] Approximately half of this comes from distributed energy sources, and half comes from utility-scale projects. At of the end of 2011, 2.66 gigawatts of utility-scale solar photovoltaic projects were under construction in California, Nevada, and Arizona.

In addition to its leadership in the field of utility-scale projects, California has paved the way for a large increase in distributed power generation. The Go Solar Plan created the California Solar Initiative to provide rebates for customers of the state's largest utilities to install an additional 1,940 megawatts of solar by 2016, along with the New Solar Homes Partnership to incentivize the installation of 360 megawatts of solar power on new homes. The National Renewable Energy Laboratory estimates that California has the technical capacity to generate more than 4,200 gigawatts of solar energy. That is more than 10 times the amount of energy produced by the entire stock of U.S. coal-burning plants—without the carbon emissions and other pollutants.[214]

While California ranks first in the nation for solar capacity and industry employment, Arizona, Nevada, and Oregon are close behind. Arizona, in particular, is embracing solar; nationally, the state ranks second in solar capacity and third in solar employment.[215]

What's most exciting about the solar explosion in these western states is that it's spurring economic growth not just in solar installation, but also across a much wider set of occupations and industries—from innovations in technology, financing, and manufacturing processes to production and commercialization, and finally, to installation. Across all these categories, this region is leading the way. As

demand grows for these low-carbon technologies, the region will continue to play a strong role in the national, and even global, solar industry.

Factors driving solar power growth in the region

Strong state and federal policies have put the Pacific Coast region in a strong position to take advantage of our country's most abundant solar resources. The National Renewable Energy Lab recently identified a region comprised of parts of southeastern California, southern Nevada, and southwestern Arizona as having the strongest solar energy potential in the United States.

Another of the lab's studies confirmed the growth potential for solar capacity in California. That study identified an estimated potential of 111 gigawatts of urban utility-scale photovoltaics, 4,010 gigawatts of rural utility-scale photovoltaics, and 76 gigawatts of rooftop photovoltaics.[216] Combined, this represents a total of nearly 4,200 gigawatts of solar potential in the state of California alone. By comparison, as of 2011 there were only 69 gigawatts of solar power installed across the entire globe, even after a sustained period of exponential growth.[217]

In the past five years, the states of the Pacific Coast region have laid the foundation for a long period of growth in solar power generation. Declining prices for solar modules and favorable policies have enabled these states to tap into the enormous potential for solar energy generation.

The vast potential for solar energy in California

Ultimate achievable energy generation for solar technologies

Urban utility-scale photovoltaics	111 GW
Rural utility-scale	4010 GW
Rooftop photovoltaics	76 GW
Total	**4,196 GW**

Source: National Renewable Energy Laboratory

Renewable Portfolio Standards, also known in some states as Renewable Energy Standards, take the lead in a suite of policies facilitating the installation of solar energy capacity.

- California's new Renewable Portfolio Standard, which was strengthened as part of the California Global Warming Solutions Act of 2006 (also known as AB32), requires that state utilities meet 33 percent of their electricity needs with renewable energy sources by 2020. The state has already met 20 percent of its electricity needs with renewable sources, and lawmakers have discussed increasing the mandate to 40 percent. Solar power figures prominently in this increase of renewable power generation, and Gov. Jerry Brown has proposed a goal of reaching 12 gigawatts of distributed generation, meaning rooftop or other small solar arrays rather than big utility-scale systems, by 2020.

- Arizona passed a Renewable Energy Standard in 2006 requiring that the state's electric utilities meet 15 percent of their energy needs with renewable sources. This standard also includes a mandate requiring solar and distributed energy to cover 4.5 percent of energy needs by 2025.[218]

- In 2009 Nevada passed into law a Renewable Portfolio Standard requiring 25 percent of electricity to come from renewable energy sources by 2025. The Nevada standard also requires solar energy to fulfill 6 percent of the state's electricity needs by 2016.

- Oregon's Renewable Portfolio Standard requires its three largest utilities to deliver 25 percent of its energy from renewable sources by 2025.

- In 2006 Washington state voters approved Ballot Initiative 937 requiring utilities serving 25,000 people or more to provide 15 percent of their energy using renewable sources by 2020.

California has been particularly focused on developing incentives for so-called distributed solar power, meaning power that is not concentrated at large utility-scale solar farms and other large installations, but across homes and businesses. The Go Solar Plan of 2006 created three key programs to increase solar photovoltaic installation. The California Public Utility Commission's California Solar Initiative is the largest solar rebate program in the world. This program consists of $2.2 billion in rebates offered between 2007 and 2016 to install 1,940 megawatts of new solar capacity on existing homes. The New Solar Homes Partnership of the California Energy Commission offers incentives for solar installation on new homes. This $400 million incentive program aims to install 360 megawatts of new solar capacity by 2016.

Not all the support has been from the public sector. The state's publicly owned utilities have committed to spending $784 million by 2016 to install 700 megawatts of solar capacity.[219] Even without the renewable energy standards and other incentives, solar energy makes sense for these companies. California utility Southern California Edison has bought into the value of solar energy. In 2011 the company signed 20-year power purchase agreements for 20 solar projects.[220] Southern California Edison and other utilities are securing access to solar energy as a reliable power source with prices that continue to fall. Solar energy has proven a valuable investment for utilities in California, where high-peak demand, expensive "spinning reserve" power plants that can provide backup power on 10 minutes' notice, and strong solar resources promote the grid-parity of this energy source.

One reason solar energy is so popular in the West is net-metering policies that allow homeowners and businesses with rooftop solar installations to sell excess solar energy back to the grid. California has had net metering since 2006, making it a strong motivator for individual purchasers of solar panels. California was the first state to get to 1 gigawatt of installed rooftop solar photovoltaics.

Strong solar policies and resources point to continued growth in the rooftop solar category. With the Go Solar Plan, California is on pace to reach a goal of 3,000 megawatts of installed rooftop solar by the end of 2016. According to recent reports, these achievements are sure to be surpassed by periods of major growth in this market. A new study by Energy and Environmental Economics for the California Public Utilities Commission indicates that California has the technical potential to add an additional 15 gigawatts of solar-distributed generation by 2020.[221] Furthermore, the National Renewable Energy Laboratory estimates that the state could eventually reach 76 gigawatts of rooftop solar systems.[222] If California stays the course with its rooftop solar agenda, then the state can expect regular growth of the solar industry and the state economy for many years to come.

More than anything else, these distributed energy systems demonstrate a contrast to the more traditional fossil-fuel-based energy path put forward by the American Petroleum Institute and its supporters. While their plan relies on centralized energy sources such as oil wells and power plants, which are controlled by a handful of companies, distributed solar is owned by individuals and brings economic gain to individuals. It's power for the people and by the people.[223]

As Tom Kenworthy pointed out in his chapter on the Mountain West, the federal government has also played a role in facilitating solar development in this region. The Department of the Interior has a roadmap to accelerate the development of utility-scale solar projects on Bureau of Land Management property. Following a two-year study of this area, the Department of the Interior identified lands with strong solar resources and limited environmental sensitivity that are eligible for solar project development. The intention of this Solar Environmental Impact Statement is to reduce the lengthy approval process for solar projects on federal land. More than half of the land identified in the study—153,627 acres—is located in California; Nevada has the second-largest portion of land identified, with more than 60,000 acres, and Arizona has more than 6,000 acres.[224]

Current and projected solar capacity

The installed solar energy capacity in the Pacific Coast region accounts for the majority of all solar capacity in the United States. Rapid increases in installed capacity and a long list of utility-scale projects currently in development point to a period of high growth in solar energy in the next few years. Utility-scale projects represent the best opportunities for significant increases in solar energy capacity, but the rooftop solar market has also driven expansion.

Utility-scale solar projects

In the arena of utility-scale solar projects, solar photovoltaic is the technology of choice. Falling prices of modules and easier installation are among the reasons why solar photovoltaics accounts for 72 percent of the utility-scale solar market in the United States.[225] At the end of 2011, PV Insider identified 865 megawatts of installed utility-scale photovoltaics nationwide, 2.9 gigawtts under construction, and 19.2 gigawatts under development. The western states dominate each of these categories, with 419 megawatts of installed capacity, 2.66 gigawatts under construction, and 15.3 gigawatts under development.[226] These numbers demonstrate the pioneering role held by the western states and point to a massive period of growth for utility-scale photovoltaics in the next decade.

Solar power shining bright in the West

Breakdown of utility-scale photovoltaics

	Entire United States	Western states
Installed capacity	865 MW	419 MW
Under construction	2.9 GW	2.66 GW
Under development	19.2 GW	15.3 GW

Source: PV Insider

Concentrating solar power systems represent another mode of solar technology gaining strength in the utility-scale market. These systems produce electricity by using sunlight to heat a fluid that spins a turbine and generates electricity. There are currently 503 megawatts of installed utility-scale concentrating solar power system facilities operating in the United States. Of this total, 428 megawatts come from California and Nevada. More than 4 gigawatts of this kind of solar power system are under development in California, Arizona, and Nevada.[227]

Local distributed solar power generation

Smaller solar installations, classified as local distributed power generation, represent another large opportunity for growth in solar energy capacity in California. Distributed generation diverges from the dominant mode of energy transmission

in which energy is produced at large plants and is transmitted over long distances. In distributed generation, smaller and localized sources distribute energy directly to the grid. Solar energy collection lends itself well to distributed generation. Millions of previously untapped rooftops across the state have the potential to produce energy for the grid with small (less than 20 megawatts) solar installations. By the end of 2011 California had reached the major milestone of installing more than 1 gigawatt of rooftop solar—a level of solar penetration that has only been achieved by five countries worldwide.

Economic dividends of solar energy in the western states

Continued growth in solar installations will deliver tremendous economic dividends to these western states. Job gains in a diverse range of categories and California's position of global leadership in clean-tech investments both highlight the economic value of the solar industry along the Pacific Coast and across the western region.

Jobs

The solar industry in California has experienced significant economic growth over the past 15 years. Since 1995 the number of solar businesses grew by 171 percent, and total employment jumped by 166 percent. By contrast, the number of Californian businesses grew 70 percent, and total employment went up by 12 percent.[228] Over the course of 2011, employment in the solar industry increased by 6.8 percent while overall state employment grew at just 0.7 percent.[229] With 25,000 people currently employed in the solar industry, California accounts for a quarter of the country's solar workforce.

California's solar boom

Comparing the growth of the solar industry with the overall economy in California

	Growth in number of businesses in California since 1995	Total employment growth in California since 1995	Employment growth in California in 2011
Overall economy	70%	12%	0.7%
Solar industry	171%	166%	6.8%

Solar photovoltaic installations are a proven job generator. Studies have found that each megawatt of solar photovoltaic capacity generates approximately 7 to 11 jobs over the lifetime of the facility.[230] California's goal is to install 1 million rooftop solar systems by 2020, growing the Californian economy by close to $30 billion and adding 20,000 jobs each year.[231]

The solar energy industry in California encompasses a range of economic activities and provides a diverse set of employment opportunities. Beyond the manufacturing of solar panels, jobs abound in installation, material feedstock supply, research and development, sales and distribution, solar system-design consulting, solar plant operations, and solar system-component manufacture, among others. According to the U.S. Solar Energy Trade Assessment 2011, site preparation, labor, permitting, financing, and other industry "soft costs" provided close to 50 percent of total solar revenue in 2010.[232] In 2010, 75 cents of every dollar spent on domestic solar installations stayed in the United States, producing a total domestic revenue of $4.4 billion.

Despite China's rise as a solar manufacturer, the United States retains a leadership role in several important segments of the solar manufacturing supply chain. In particular, we are competitive in the manufacture of the component parts that are critical to the final assembly of large solar arrays. This makes sense: Assembly of these large systems is most easily done near their installation, and, as we've discussed, the western region is a leader in installed solar capacity.

In particular, the United States remains strong in the manufacture of installed inverters (45 percent of those used domestically are produced domestically), mounting structures to anchor the solar panels (94 percent produced domestically), and combiner boxes and other miscellaneous electrical components (59 percent produced domestically).[233] These numbers tell an important story for this region and for American manufacturing more generally—where there is consistent demand for a highly engineered and innovative product, conditions are good for the local manufacture of that product.

One challenge facing the region's solar industry is the lack of skilled workers prepared to enter the huge range of mid- and high-skill jobs that make up this sector. Employers in the solar industry have identified issues with a lack of solar-specific training in the labor force. The Solar Foundation finds that more than 50 percent of solar industry employers encountered difficulty hiring qualified solar designers, solar installation managers, sales representatives, and solar photovoltaic technicians.[234] Accordingly, vocational programs would do well to incorporate solar training to their

programs to increase the qualifications of the potential solar workforce. Currently 54 community colleges in California offer some type of solar training. Increased knowledge of basic solar energy production and solar plant management in these programs will increase the qualifications of solar industry applicants.[235]

Clean technology and the economy of innovation

Growth in the global solar market is driving significant venture capital deployment in the clean-tech field. The United States is a proven world leader in this arena. In 2011 more than 90 percent of global solar venture capital funding came from our country, with half of these investments coming straight from California.[236] Our companies and public labs and universities also put significant resources into solar innovation: Half of worldwide investment in solar research and development came from U.S. public and private sources in 2011, totaling $1.1 billion.[237] This research is resulting in real projects. California registered a total of 105 patents in 2010 for solar technologies and holds 45 percent of all U.S. solar patents and 24 percent of the entire world's solar patents.[238]

In a positive feedback loop, these investments in new solar innovations help drive down the cost of solar system installation and increase the market for solar products. They've also kept the United States—and California in particular—at the leading edge of the global solar marketplace. Even as traditional solar technologies such as the solar photovoltaic panel become mass-marketed, and production moves overseas, California and other strong solar states are inventing new products and processes that are bringing down the cost of solar power and making it available for new markets and applications, driving a new wave of innovation and manufacturing here at home.

There is no doubt that solar energy is contributing to the robust growth of renewable energy generation in the Pacific Coast region. Increasing levels of solar capacity enable California's economy to grow while decreasing carbon levels, and the state and surrounding region are able to stay on the leading edge of new solar technology development. That translates to the ideal assembly line of progress for the 21st century—moving from brainpower to innovation, new technologies, more jobs, and a safer environment.

Off the grid: America's unique energy regions

Despite a glut of domestic energy resources, several regions in the United States face unique and very geographically specific logistical challenges to energy generation and transmission. As a result, these regions face higher energy costs and/or decreased reliability.

The average retail price per kilowatt hour of electricity in the United States is just under 10 cents, but residents in Alaska and Hawaii pay up to 2.5 times that amount. The upper New England states, which on first glance don't seem to be cut off from the U.S. energy mainland, pay more than 1.5 times the national average because of their geographical isolation from the major natural gas and coal resources on the rest of the East Coast.

Generally, these regions lag behind the rest of the nation in renewable electricity capacity and generation and are more susceptible to fluctuations in energy prices. Yet their very uniqueness makes them ideally suited for energy innovations that might not be cost competitive in other parts of the country.

Hawaii

As of 2010 Hawaii imported 94 percent of its energy and had the highest electricity prices in the nation. According to the U.S. Energy Information Administration, Hawaiians paid as much as 42 cents per kilowatt hour, more than four times the national rate of 9.8 cents. The state, however, is uniquely positioned to increase both geothermal and solar energy capacity.

Government data show that Hawaii's solar photovoltaic electricity generation more than doubled from 2010 to 2011, making it third in the nation in installed photovoltaic capacity on a per-capita basis.[239] A quarter of Hawaii's net renewable electricity production is derived from geothermal power, and the state boasts the world's largest commercial electricity generation plant—fueled exclusively with biofuels. Yet renewables comprise just 7 percent of the state's total electricity production. About 90 percent of Hawaiian electricity is derived from petroleum (74 percent) and coal (14 percent).[240]

The cost of solar power in Hawaii is between 20 cents and 40 cents per kilowatt hour, depending on the island, which makes it price-competitive with electricity generated from petroleum. As of August 2012, residential rates for electricity ranged from 34 cents per kilowatt hour in Oahu to 42 cents per kilowatt hour on Molokai.[241]

Geothermal energy only accounts for 1.2 percent of the state's total electricity generation capacity, but state legislators aim to increase geothermal capacity in an effort to reach Hawaii's goal of 70 percent renewable electricity by 2030, as laid out in the Hawaiian Clean Energy Initiative. The state's sole geothermal power plant, Puna Geothermal Venture, is located in Puna, on the island of Hawaii, and currently produces 38 megawatts of capacity each year.

In addition to advancements in solar and geothermal energy, the state is also achieving significant results with converting waste to energy. The HPOWER facility on Oahu will provide between 7 percent and 8 percent of the power to the island, where 80 percent of the state's population resides, and will contribute millions in direct and indirect spending to the local economy.[242]

Alaska

Alaska's geography and far-flung population pose significant challenges to the development of energy infrastructure in the state. Although Alaska ranks 39th in the United States in overall annual energy consumption,[243] it ranks fourth in electricity generated from petroleum liquids.[244] The average retail price for electricity in Alaska is 14.76 cents per kilowatt hour compared with the national average of 9.8 cents.[245] Scattered rural communities, representing more than a quarter of the state's population, rely on individual microgrids powered by diesel generators. Alaska has the highest diesel prices in the country, at $21.16 per million British thermal units.[246] The combined costs of diesel fuel and transportation to remote sites contribute to rural retail electricity prices as high as 10 times the national average ($1 per kilowatt hour).[247]

Wind power is emerging as a viable energy source for these regions. Wind towers, installed in freezing winter temperatures so as not to permanently disturb the tundra's permafrost in summer, have begun to displace diesel fuel as the sole energy source. These wind towers, feeding directly onto the microgrids, can cover between 30 percent and 60 percent of the energy needs of rural communities.[248] Wind generation projects typically pay for themselves through fuel savings within five years to 10 years.[249] The American Wind Energy Association indicates typical payback periods for small wind systems range between six years and 30 years, depending on wind turbine technology, wind quality, and prevailing electricity rates.[250]

New England

The news is full of stories about America's abundant natural gas supplies, many of which are located in the eastern United States. But New England is mostly cut off from this natural gas boom. These states—Massachusetts, Rhode Island, Connecticut, Vermont, New Hampshire, and Maine—rely on natural gas for more than half of their electricity generation, yet limited pipeline capacity is forcing the region to import a substantial portion of its fuel from abroad.[251]

Since 2010 up to 20 percent of the region's supply has originated in Yemen, prompting Rep. Ed Markey (D-MA) to ask Secretary of the Department of Energy Steven Chu what impact rising terrorism in that country might have on natural gas availability. Even now, average retail electricity costs in New England are well above the national average, at 14 cents per kilowatt hour—approximately the same as the average cost in Alaska—yet volatility in Yemeni distribution networks has resulted in even higher costs for consumers.

Despite the boom in domestic natural gas production across our nation, limited transmission capacity threatens the regional stability of electricity supply and prices. Although the states in New England have invested proceeds from the Regional Greenhouse Gas Initiative auction heavily into energy efficiency, they generally rank in the lower half of renewable energy capacity and generation in the country.[252]

Yet commitments from six states at the New England Governors' Conference in July suggested that the states are increasing their investments in renewable energy to diversify their energy portfolios.[253] Furthermore, renewable energy standards in Massachusetts, New Hampshire, Vermont, Connecticut, Maine, and Rhode Island point to growth in electricity supplied by renewable sources.

Conclusion

National recommendations

America is an enormous country made up of varied and diverse regions with their own natural resources, infrastructure, and energy consumption patterns. The diversity of our regions means we need a multifaceted energy strategy that leverages the best of what each area has to offer—one that puts our country squarely on the path toward long-term competitiveness, energy security, and climate stability.

Just as the oil industry has relied on government investment and targeted policies since the early 1900s to secure its place in the U.S. energy market, so do alternative energy industries need support from both the public and the private sector to get to scale across America today. Some of these supportive policies must happen at the national level to provide consistency and regulatory certainty across every region of the country. Others are more specific to particular regions or technologies.

What follows is a list of some of the most important policies we need to get America onto a more diverse, more stable, and more sane energy path.

Internalize the actual price of pollution

Right now, fossil fuels enjoy an unfair advantage in the energy market because their price doesn't reflect the actual health, environmental, or social costs of burning the dirty fuels for energy. Take coal, for example: According to Harvard Medical School researchers, the average "external cost" of coal is around 18 cents per kilowatt hour.[254] Add this to the U.S. average energy price of around 10 cents per kilowatt hour, and suddenly every region has Hawaii-level energy bills. Putting a price on pollution—whether through a carbon tax, an emissions reduction and trading system, traditional regulatory structure, or other means—puts all energy technologies on a level playing field with regard to their ability to meet our energy and environmental needs.

A clear carbon price provides market-based incentives that complement and speed (rather than undercut) the deployment of the clean energy and efficiency technologies and policies we discuss throughout this report. It gives businesses the long-term certainty they need to invest in new technology and infrastructure. Putting a price on carbon would help shift the burden of paying for pollution (and paying for the solutions to pollution) from taxpayers to polluters, as well as level the playing field for the energy sources of the future.

Ensure a diversity of sources through a clean energy standard

Putting a price on pollution won't necessarily lead to energy diversity, though it's a great start. One thing we must certainly avoid is an energy future that's just as unbalanced and tilted toward one set of industries and energy sources as the one we have today. That's why we need a national clean energy standard that calls for 80 percent of the country's utility-scale energy to be produced using a diversity of low-carbon energy sources. To guard against natural gas taking over the low-carbon energy market, we need a carve-out for renewable energy within such a standard.[255]

Make a commitment to energy diversity on public lands through a clean resources standard

If the country is committed to moving forward into the advanced energy future, we should model that commitment on our public lands. Right now, more than 65 percent of the electricity generated from resources mined on public lands comes from coal, and only 1 percent comes from renewable sources such as wind, solar, and geothermal energy.[256]

We support a clean resources standard that would require a better balance of resources produced on public lands—much as the clean energy standard would do for private utility-sector energy.

Stand behind strong American standards that provide the certainty to drive innovation, investment, business, and job creation

As we have seen vividly in the auto industry, our current and long-term prosperity depend in part on strong, smart standards that give corporations the certainty they need to build the plants of the future here in America. These standards align the huge U.S. market with global demand, helping spur innovation and manufacturing here and exporting it abroad, rather than leaving our industries subject to a long, slow decline while American consumers buy the best products from countries that had greater foresight. Nowhere is this more critical than in the environmental and energy standards and policies we set. There is growing pressure on all types of resources worldwide, and the products that best protect water, air, and climate and that deliver the greatest quality of life with the least or cleanest energy will serve a global market of billions.

To protect both our economic and environmental future, Americans should strongly reject attacks on existing landmark standards such as the hugely effective Clean Air and Clean Water Acts and new fuel economy standards. Policymakers should act on new standards such as the clean energy standard recommended above that would jumpstart forward-looking investment and growth in more industries.

Give renewable energy investors and developers certainty by extending the production tax credit and investment tax credit

Without a level playing field and with artificially low fossil fuel prices competing with renewable energy prices, it's been difficult to get private investors interested in building renewable energy projects at scale. But they've invested anyway, in large part because of the production tax credit and investment tax credit, which provide developers an incentive to build wind and solar projects. But these credits have always limped along, only extended for short periods and always after a battle in Congress.

Despite very strong bipartisan support, the production tax credit is set to expire at the end of this year and the investment tax credit at the end of 2016, resulting in tens of thousands of workers potentially losing their jobs in nearly every state across America. Until we can level the playing field for renewable energy, we need these tax credits to be extended—ideally for long enough to give investors real certainty that America is committed to a sustainable energy path.

Promote U.S. competitiveness through clean energy research and development, commercialization, and domestic manufacturing

We have focused throughout this report on the ability of advanced energy projects to create jobs across industries and occupations, from invention and manufacturing to installation and operations. Because the advanced energy infrastructure is not yet built out (unlike the fossil fuel infrastructure), these projects create a disproportionate number of jobs in construction and manufacturing, which are good for middle-skill workers looking to make a decent wage. To capture these jobs, however, it is imperative that we stay at the cutting edge of advanced energy technology development, which means we need to invest in our labs and universities. To keep these new inventions from being developed and manufactured overseas, we need to invest in our commercialization and manufacturing programs.

That means not only sustaining but also increasing support for the Department of Energy's basic research and development and Advanced Research Projects Agency–Energy programs, which provide financing for innovative companies that are at the precommercialization stage. It means finally creating a Clean Energy Development Administration that can focus on commercializing the best products coming out of that research. And it means continuing to fund programs such as the so-called 48C tax credit for manufacturers, which allows our existing American firms to retool and expand to meet the needs of new clean energy industries. Finally, a true manufacturing renaissance requires that we develop proactive regulatory and manufacturing policy in tandem to ensure that the next generation of investment isn't making yesterday's goods and services.

These are some of the national priorities we must embrace if we want to diversify and sustain the American energy system.

Regional recommendations

There also are some specific regional priorities we recommend to accomplish and build on the projects discussed in this report.

The Atlantic Coast

Along with extending the production tax credit and making it more readily available to offshore, as well as onshore projects, we recommend a continued commitment to the Bureau of Ocean Energy Management's Smart from the Start program, which encourages stakeholder engagement and efficient development of new renewable energy projects on national waters.

The Gulf Coast

We'd like to see those who were responsible for the massive Deepwater Horizon oil spill held accountable, and the damages they pay returned to the region to support coastal restoration projects. The recently passed RESTORE Act guarantees that 80 percent of Clean Water Act fines paid by the responsible parties will be dedicated to economic and environmental restoration projects in the affected states. We recommend that when these fines are actually in hand, the primary focus should be on investing in projects to restore ecosystem service benefits, especially for the economically and socially vulnerable communities that depend most on the region's natural resources for flood protection and their livelihoods. Projects should create clear socioeconomic benefits by also investing in job training and promoting economic opportunities in contracting for local workers and businesses.

The Southeast

For the Southeast, we recommend state-level action to truly embrace energy efficiency and the smart grid as core policy priorities and to engage major utilities in more rapid deployment. The southern states are behind the rest of the country in passing Energy Efficiency Resource Standards and updated mandatory building codes. Implementing these policies and others that incentivize industrial, commercial, and residential efficiency will create a market for energy efficiency products in the region—one that its strong manufacturing base is already poised to serve. This region can become a center of excellence for energy efficiency and for cutting-edge smart-grid technology, but it can only happen if there is a strong local market that can serve as an anchor.

The Midwest

The industrial Midwest has recently been well-served by public policy decisions, which have worked together to support an auto manufacturing renaissance. Strong and well-developed emission standards pushed the auto companies to innovate; targeted loan and tax policies helped automakers retool and expand to serve these emerging efficient vehicle markets; and state economic and workforce development programs helped provide the infrastructure the auto sector needed to ensure these products were made in America. Voters need to reject attacks on these programs at the state and federal level, recognizing how important national policy can be to local gains. Similarly, states or cities may want to consider local measures and partnerships to expand the innovation, manufacturing clusters, and markets needed grow this success.

The Mountain West and the Pacific Coast

The national policies we discussed above will go a long way toward balancing our energy resources and supporting sustainable and smart low-carbon energy development. The states in these two regions of our nation are already models of promoting energy diversity through good public policy. Most of the western states have renewable energy standards, and California is pioneering the country's first economywide carbon reduction program, known in the state as AB32. These are states to watch, but without a strong and supportive set of national energy policies, they can only go so far.

One size does not fit all

It's true that these solutions are more diverse and varied than the American Petroleum Institute's recommendation to just "drill here, drill now." But we live in a diverse and varied country, and one size most certainly does not fit all—especially when it comes to building a sustainable, resilient, long-lasting energy economy.

Indeed, one size fits all has never applied to America, and the nation's energy policy is no exception. Our strength lies in our diversity and in the ability to find creative solutions to the next set of challenges. Seen through the lens of the American Petroleum Institute, America is one-dimensional and kept on an all-carbon diet of oil and gas. They offer one solution for creating jobs and addressing our energy

needs—one solution that ignores the devastating implications of climate change and the tremendous opportunity presented by the clean energy economy.

America is so much more than that. From powerful winds blowing off the Atlantic Coast to blazing sun in California, to the new generation of clean cars being manufactured right now in the Midwest, each state and region has a unique set of resources and strengths that will create the next generation of jobs, address the urgent need to dramatically reduce our carbon emissions, and take real steps toward achieving energy independence.

Only the most foolhardy investor puts all his money on one stock. Only the most desperate gambler bets the house on a single roll of the dice. We are not foolhardy, and we are not desperate. Our vision can't and shouldn't be simplified, for its biggest asset is its diversity, and its benefits extend from coast to coast.

Our vision relies on American resources and innovation to build strong, healthy, resilient communities and economies, weaving together a national energy fabric that is much stronger than one comprised of drilling alone. Because, as every American knows, our country is far greater than the sum of its parts.

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