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**Pay Now, Pay Later:  
A State-by-State Assessment of the Costs of Climate Change**



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## INTRODUCTION

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### **The Reports**

The American Security Project has produced a series of 50 reports which analyze and project possible economic losses on a state-by-state basis as a result of unmitigated climate change matched with the opportunities we have if we start to invest in renewable, clean sources of energy and energy efficiency measures.

The project, “Pay Now, Pay Later” (PNPL), draws attention to the costs of inaction for each state if America fails to reduce greenhouse gas emissions.

The PNPL reports show there will be costs to our economy, security, competitiveness and public health and that the costs of inaction will be steep for each state.

PNPL concludes that inaction on climate change outweighs the cost of transforming our old energy economy into a green one, meaning: if we do nothing and don’t properly invest in renewable, clean sources of energy now, we run the risk of paying significantly more in the future, after climate change effects take an inevitable toll on our environment.

### **The Interactive Map**

The PNPL reports can be found online at [www.americansecurityproject.org](http://www.americansecurityproject.org) through an interactive map of the United States.

Users can click on the map to access a comprehensive report on each individual state.

### **The Research**

Data obtained for the PNPL reports has been aggregated from a variety of leading institutions, including: universities, private organizations, research and public education institutions and government entities.

## Q&A

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***Q: What is Pay Now Pay Later?***

**A:** Pay Now, Pay Later (PNPL) is a series of 50 reports which analyze and project possible economic losses on a state-by-state basis as a result of unmitigated climate change matched with the opportunities we have if we start to invest in renewable, clean sources of energy and energy efficiency measures.

PNPL draws attention to the costs of inaction for each state if America fails to reduce greenhouse gas emissions.

***Q: What organization is responsible for producing PNPL?***

**A:** The American Security Project, a non-profit, bipartisan public policy and research organization dedicated to fostering knowledge and understanding on a range of national security issues, promoting debate about the appropriate use of American power, and cultivating strategic responses to 21st century challenges.

***Q: What are some key findings from the PNPL reports?***

**A:** The PNPL reports show there will be costs to our economy, security, competitiveness and public health and that the costs of inaction will be steep for each state.

For example, climate change will cause drier ecosystems which will host more frequent forest fires hurting timber industries. In Arkansas, the timber industry employs tens of thousands and in Kentucky, generates roughly \$9.3 billion in revenue and employs approximately one out of every nine manufacturing workers in the state.

Climate change is projected to take a heavy toll on the tourism and agriculture industries. Tourism accounted for \$1.4 trillion in spending in 2010, and the corn crop is our most widely produced feed grain, expected to yield over \$90 billion in revenue this year.

The findings in the PNPL reports tell us that we cannot afford to continue business as usual. Our old energy economy is not only costing us too much—in more ways than one—but it is not sustainable given the toll climate change will take on our environment, communities and industries.

***Q: Which regions will be most affected as a result of unchecked climate change?***

**A:** The reality is, climate change will affect various regions of our country at varying times and in varying ways. Transforming our energy economy is going to have a cost. We have a choice: pay now or pay later. We can chose to invest in renewable, clean sources of energy now or pay significantly higher economic and social costs in the future.

***Q: Where can I find out the costs of inaction for my state?***

**A:** The PNPL reports can be found online at [www.americansecurityproject.org](http://www.americansecurityproject.org) through an interactive map of the United States.

Users can click on the map to access a comprehensive report on each individual state.

## FACT SHEET

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- Climate change will affect every state in the US; it will cost American jobs and billions of dollars.
- The PNPL reports show there will be costs to our economy, security, competitiveness, and public health and that the costs of inaction will be steep for each state.
- Tourism, agriculture, and the defense industry will be hit hard as a result of climate change. Most regions in the US are heavily dependent on the tourism and agricultural industries. In 2010, the tourism industry employed approximately 7.7 million people ([Source](#)); the corn crop is most widely produced feed grain in the US. In addition, military bases on the east coast are vulnerable to extreme weather events. In 1992, Hurricane Andrew damaged Homestead Air Force Base in Florida to the point that it never reopened ([Source](#)).
- Climate change can cause:

Increasing temperatures	Increased flooding
Heat waves	Coastal erosion
Rising sea levels	Water shortages and droughts
More forest fires	Higher smog and ozone levels
Increasingly severe storms	Vast health hazards

According to the PNPL reports:

- In the Great Lakes region, 30% of the workforce is projected to be at risk, as the Great Lakes' system connectivity is disrupted.
- In the Midwest states, temperature and rainfall increases over 30-year averages would cost over \$9 billion in lost in agriculture profits.
- In Alaska, melting permafrost is expected to add up to over \$6 billion to Alaska's public infrastructure costs in the next 20 years.
- In the Northwest, by the 2040s, higher temperatures are expected to decrease snowpack in the Cascade Mountains by up to 40%, leading to water shortages and droughts.
- In the Southeast, energy costs could rise by almost \$60 billion by 2100—in a business-as-usual scenario—as a result of increasing temperatures.
- In the Southwest, Lake Mead could dry up as soon as 2021, leaving 12 to 36 million people across the region without a dependable water supply.
- In New England, one in 10 workers could be affected; for example, shifting weather patterns could disrupt the fall and winter tourism economies.
- In the mid-Atlantic states, rising sea levels and coastal erosion could threaten the billion-dollar tourism and seafood industries.

## PRESS RELEASE

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### Pay Now, Pay Later: A State-by-State Assessment of the Costs of Climate Change

*The American Security Project publishes telling reports on the economic costs of inaction on climate change for each state in the U.S.*

**WASHINGTON D.C. April 2011** – On April 19, 2011, the American Security Project will release a series of 50 reports which analyze and project possible economic losses – or in some cases, gains – on a state-by-state basis as a result of unmitigated climate change. The project, “Pay Now, Pay Later,” (PNPL) draws attention to the costs of inaction for each state if we fail to reduce greenhouse gas emissions.

**Dr. Jim Ludes**, Executive Director of the American Security Project (ASP), said: *“The costs of inaction on climate change will be steep for each state, as our reports outline. We’re looking at major costs to our economy, security, competitiveness and our public health. Kentucky’s timber industry, alone, generates \$9.3 billion for its economy; Arkansas’ employs tens of thousands. This will be damaged as a result of drier ecosystems, which are susceptible to harsher and more frequent forest fires.”*

**Lindsey Ross**, Policy Analyst for Climate Security at ASP, added: *“Severe storms and erosion threaten coastal communities, thus the warming and rising of sea levels could affect the 10 million plus people who live on Florida’s coast and other similar communities. Additionally, more severe storms and receding lake levels could disrupt shipping industries in states like Georgia, Ohio and Michigan—a state that could suffer over \$4 billion in import and export losses as a result of a decline in the Great Lakes system connectivity within the next several decades. In the U.S., we’ve already seen how a severe storm can economically devastate a region.”*

The PNPL reports show the costly, negative effects on our communities, our industries and our jobs. The cost of inaction outweighs the cost of transforming our old energy economy into a green one. According to the Congressional Budget Office, a prominent cap-and-trade proposal would have cost \$22 billion a year by 2020 –a total of roughly \$175 per U.S. household. A small amount compared to the costs inaction will likely inflict. Moreover, one study finds investments in renewable energy—which requires less spending on machinery and imports—creates 3.5 more jobs per dollar spent than spending on the old energy economy.

**Ludes** went on to say: *“A lot of people can tell you the cost of proposals to address climate change, but nobody is talking about the cost of doing nothing to meet the climate change challenges we face in the United States. The findings in the Pay Now, Pay Later reports tell us that we can’t afford to continue business as usual. There are inevitable changes—short term and long term—in our environment that will have costly effects on our economies. We can either pay a little now to address it, or pay a lot more in the not-so-distant future.”*

**#END#**

**About the American Security Project:** *The American Security Project is a non-profit, bipartisan public policy and research organization dedicated to fostering knowledge and understanding of a range of national security issues, promoting debate about the appropriate use of American power, and cultivating strategic responses to 21st century challenges. For more information, visit [www.americansecurityproject.org](http://www.americansecurityproject.org).*

## SITUATIONAL AWARENESS: THE PRESENT

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According to the Congressional Budget Office, a prominent cap-and-trade proposal would have cost \$22 billion a year by 2020, which is roughly \$175.00 per U.S. household. Although \$22 billion may seem like a large amount, it is actually a small amount compared to the projected total monetary costs of inaction on climate change.

One study cited in the PNPL reports finds that investments in renewable energy actually create 3.5 more jobs per dollar spent than spending on the old energy economy. Jobs in a “new energy economy” would require less spending on machinery and imports. *(Source: Political Economy Research Institute, University of Massachusetts Amherst)*

Climate change is real, and it’s happening. There are inevitable changes occurring in our environment that will have costly effects on our state and national economies.

The findings in the PNPL reports tell us that we cannot afford to continue business as usual. Our old energy economy is not only costing us too much—in more ways than one—but it is not sustainable given the toll climate change will take on our environment.

**Bottom Line:** Climate change will have its costs in the United States. There will be costly, negative effects on our communities, our industries and our jobs. We can either pay less now to address it, or pay a lot more in the not-so-distant future to adapt to it.

**Doing nothing about climate change will have a cost.**

## SITUATIONAL AWARENESS: THE FUTURE

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Climate change will inevitably affect our national landscape and the American people.

The effects of climate change will take several—and sometimes seemingly contrary—forms, yielding various consequences across our expansive country.

Warmer temperatures will cause summers to become drier, winters and springs wetter, while placing stress on communities, local economies and crucial industries.

For example:

- Prolonged periods of drought will increase in frequency with warmer temperatures, progressively drying up the rivers, streams, and lakes upon which Americans depend on for sustenance and recreation. Seemingly at odds with this, severe storms will also increase in frequency and intensity, causing flooding and run-off. This will contaminate already receding American waters, increasing the concentration of harmful chemicals, and further reducing the water supply. As a result, the swimming days in places like Lake Michigan and Lake Erie will be numbered. Additionally, hundred-year floods, or floods whose wrath has a 1% chance of occurring in a given year throughout the century, will increase in frequency.
- In winter, many snow days will become rainy days, dramatically affecting the frozen precipitation many regions are accustomed to and—in some cases—are dependent on. Glaciers and snow packs, progressively melting—and with increasing speed—will not be replenished at the necessary rate, further draining the water supply upon which we depend. Southern Californians, dependent on snow packs in the northern part of the state for their water, will be among those significantly affected. The increased rate of melting will contribute to rising sea levels, affecting the 53% of the American population currently living in coastal counties.
- A farmer's nightmare, fewer freezing days will also lengthen the lifespan of agricultural pests, augmenting their ability to proliferate. Existing in warmer environments and attacked by drought, trees and plants will not only be more vulnerable to these pests, but also to wildfires. Existing ecosystems will be significantly affected; necessitating migrations and adaptations and affecting generations of American sportsmen.

**We must invest now or pay much more later.**

## KEY FACTS AND FINDINGS: GENERAL

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Hurricane Katrina and other severe storms and floods in the U.S. have shown us how natural disasters can economically devastate a region. The costs of inaction on climate change in America are steep. Research from Pay Now, Pay Later (PNPL) shows:

### **There will be costs to the economy**

Drier ecosystems will host more frequent forest fires, hurting timber industries.

In Arkansas, the timber industry employs tens of thousands. In Kentucky, it generates roughly **\$9.3 billion** in revenue and employs approximately one out of every nine manufacturing workers in the state.

Droughts, heavy precipitation, water shortages, warmer temperatures, and an increase in pests will place strains on American farmers, reducing the quantity, quality and value of crop yields.

### **There will be costs to our security**

Increasingly severe storms and coastal erosion threaten American communities lining the coast. The warming, rising waters of the Atlantic and the Gulf of Mexico place much of the infrastructure and **10.5 million people** along Florida's coastline in jeopardy.

Water shortages will threaten the amount of drinking water available. This is especially true in the Great Plains where water is currently being pumped from the Ogallala Aquifer faster than it can recharge; it is essential for irrigation and provides drinking water to **80%** of the Great Plains population.

Lake Mead could dry up as soon as 2021, putting Nevadans' access to reliable and affordable water in jeopardy and leaving **12-36 million people** across the region without a dependable water supply.

### **There will be costs to our competitiveness**

The projected flooding, severe storms, and receding lake levels will cause disruptions to the shipping industry in many states like Georgia, Michigan, and Ohio, causing losses to shipping, transit and manufacturing sectors

Increased costs from road repairs and dredging are likely to reduce the profitability of these sectors, our competitiveness, and our import/export capacity.

In Michigan alone, a **25%** reduction in Great Lakes system connectivity—predicted to occur in the next several decades—could cost over **\$4 billion** in import and export losses across the state.

### **There will be costs to our health**

Increasing temperatures will raise smog and ozone levels, increasing the incidence of asthma. Increased heat waves will compound these health risks, which in 2006 affected **750,000 Tennesseans**, causing **192 deaths** and cost around **\$125.6 million**.

The Chicago heat wave in July of 1995, with temperatures that reached 106°F, killed over **500 people in 5 days**. Chicago could experience as many as 30 days with temperatures of 100°F or higher each summer, toward the end of the century.

## KEY FACTS AND FINDINGS: STATE-BY-STATE

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The following information has been extracted from the comprehensive state reports.

### Alabama:

- Alabama's agriculture, forestry, and wildlife-related industries are sensitive to climate change and account for approximately \$20 billion annually. This is roughly 12% of Alabama's gross state product.
- A drier future would convert some forests into grasslands and increase forest fires. A wetter one would attract more pests and favor hardwoods over softwoods. The outdoor recreation industries are strongly dependent on the state's biodiversity. The 2.3 million anglers, hunters and wildlife viewers would be likely to suffer.
- Alabama's population is expected to increase by roughly 700,000 people by 2025. Jobs may not grow as quickly. There is much to suggest that climate change will depress employment in some key state industries, such as agriculture and wildlife-related industries. At least 261,000 Alabama jobs may be threatened by climate change.
- At least 21 of the 70 natural disasters that caused \$1 billion or more in damage in the United States between 1980 and October 2007 affected Alabama. This includes two Category 2 hurricanes and six Category 3 hurricanes. Storm intensity and damage will increase with climate change and rising sea levels. Mid-range projections anticipate a sea level rise of up to 15 inches by 2100.
- Alabama already supports nearly 8,000 jobs in clean energy and related industries. The state could gain nearly 30,000 more from a major clean energy initiative.

### Alaska:

- Melting permafrost is expected to add between \$3.6 and \$6.1 billion to Alaska's public infrastructure costs in the next 20 years. Permafrost is the layer of earth that remains frozen throughout the year. It is the foundation on which Alaska's infrastructure is built. As a result, roads, water and sewer infrastructure, landing strips, and the Trans-Alaska Pipeline System will require significant additional maintenance.
- Nearly half of the Alaskan population lives along the coast. Often coastal communities must choose between relocation and the construction of expensive infrastructure, the efficacy of which is uncertain. The U.S. Army Corps of Engineers estimates a \$30-\$50 million price tag for each Alaskan village that needs to be relocated. Other estimates place costs as high as \$400-\$450 million for relocation. Alaska is home to 160 such villages. At least six are already planning to relocate.

- Certainly, at some future date, investment in renewable energies would negatively affect North Slope oil production and the oil industry, which generates 35% of the Alaskan gross state product. Problems and impediments already exist, however. Between 1970 and 2002, the number of days hospitable to oil drilling and exploration were nearly cut in half due to the thawing permafrost.
- The area of Alaskan forests burned by fires is expected to double by 2050 or even quadruple by the end of the century.
- Alaska has massive wave power. Its southern coast alone can potentially produce 1,250 TWh per year. This is more than 184 times Alaska's current total net electricity generation.

## Arizona:

- Arizona's skiing industry is extremely sensitive to seasonal precipitation. Changes in snowfall determine the number of days ski resorts can open. A shorter snow season can have significant effects on revenue. For example, the Arizona Snowbowl ski facility is open an average of 96 days per season and generates \$15.8 million in direct revenue. But during the 2001-2002 season, the facility was only open for four days; it was able to open 16 days in 2005-2006. Each season, losses reached between \$13 and \$15 million.
- There is a reported 50% chance that Lake Mead—the Hoover Dam's reservoir on the Colorado River—will be dry by 2050. This could likely cause a region-wide drought that would leave 12-36 million people in the Southwest without a secure source of water.
- Falling water levels in lakes and reservoirs are estimated to harm the tourism industry. A 5% decrease in visitors is expected for every 1% of water volume lost. In 2003, Lake Powell and Lake Mead declined 5.4% and 2.1%, respectively, reducing visitors to the Glen Canyon National Recreation Area by 500,000. As a result 758 jobs, \$32.1 million in tourist spending, and \$13.4 million in income were lost.
- The two worst wildfires in Arizona's history occurred within the past 8 years. The Rodeo-Chediski fire in 2002 cost \$139 million for rehabilitation and caused a total of over \$308 million in direct and indirect costs. Prolonged periods of drought and forest fires are expected to increase with climate change.
- A national renewable energy standard and spurred investment in renewable energy could create thousands of construction jobs and 4,000 permanent jobs in Arizona in the next 10-15 years.

## Arkansas:

- A wider infestation of pine beetles and forest fires will place the Arkansas pine timber industry at risk. Forests cover over half of Arkansas' land area; it is an integral component of the Arkansas economy. The forest product industry is the largest manufacturer in state. For decades, infestations have had catastrophic effects in the region. Annual losses have

cost as much as \$237 million. Damages are expected to quadruple with warmer temperatures.

- The changing climate could reduce the duck population in Arkansas by as much as 50%. This would significantly curtail hunting and associated tourism expenditures worth over \$50 million a year. The reduction of the duck population also puts at risk a time-honored tradition passed on from generation to generation.
- Twenty percent of Arkansans are employed in an agriculture-related industry. This puts 1 in every 5 jobs at risk should climate change continue unmitigated.
- Precipitation in the region has increased 20-30% over the last 100 years. Flooding, and the soil erosion it causes, is harmful for crop growth. More than one-fifth of the state lies in the flood zone.
- Arkansas depends on coal-powered plants for nearly half of its electricity. The state spent \$463 million importing coal in 2008. This equates to roughly \$160 per Arkansan. However, Arkansas is rich in biofuels, which can be produced inexpensively. Biofuels could generate 150% of Arkansas' residential electricity needs.

## California:

- Under a high emissions scenario, Californian sea levels are projected to rise 22-30 inches by 2100. Protecting the San Francisco Bay coastal areas alone could cost \$6-30 billion each year.
- California has the most polluted air in the country. This pollution (ozone and particulates) causes 8,800 deaths and costs the state \$71 billion annually. These numbers will rise with the projected increases in temperature and air pollution levels across the state.
- Californians employed in the threatened agriculture and tourism industries make up roughly 11% of the labor force. Over 1 in 10 Californian jobs are jeopardized by climate change.
- Warmer temperatures, changes in precipitation and altered weather patterns, will increase the risk of large wildfires in California by as much as 55%. In 2008, the federal government spent \$200 million to fight wildfires in California. This includes three that cost \$50 million each. This large expenditure does not include damage to infrastructure, private residences, and businesses.
- In 2008, Californians generated 208 million MWh of energy and produced 48 million MWh from renewable sources. Its capacity for renewable energy generation is projected to be as high as 246 million MWh each year. Still, the state imports more energy from the rest of the U.S. than any other state.

## Colorado:

- Cattle ranching accounts for almost half of Colorado's \$5.5 billion agricultural industry. Temperature increases will likely make the Eastern Plains' grazing areas unsuitable. This could potentially drive the important industry out of the state.
- Climate change will seriously jeopardize the vast natural resources that underpin Colorado's \$11 billion recreation and tourism industry. Nearly 1 in 5 Coloradans are employed in an industry sensitive to climate change.
- Colorado's \$1.9 billion ski industry may become unprofitable as decreasing snow packs will shorten the winter sports season by an estimated 30 days. The ski industry employs 31,000 people. A lack of snow is predicted to seriously damage the Aspen ski area by 2100.
- Approximately three-quarters of the annual water flow in many of the Rockies' major rivers is a product of spring snowmelt. Some snowpack areas are projected to fall by as much as 80% compared to current levels. This is likely to make water shortages a regular occurrence throughout the state. One estimate forecasts an 18% reduction in runoff from 2040-2069.
- Clean energy legislation and \$2.6 billion in energy efficiency investments from 2012-2019 could likely create an estimated 11,000-30,000 jobs. It would also contribute to direct energy savings of over \$7.5 billion. This equates to \$1,500 for each Coloradan.

## Connecticut:

- The forested Connecticut landscape provides ample opportunity for residents and tourists alike to appreciate hunting, fishing, and wildlife viewing. These industries generate nearly 10,000 jobs and an average of \$830 million annually. Culture and tourism generates over \$14 billion for the state each year. This equates to roughly 8% of gross state product. Rising temperatures threaten wildlife and forests in Connecticut.
- In a high emissions scenario, Connecticut is expected to see longer, more intense heat waves and more frequent flooding. Flooding and a rising sea levels will significantly affect the coastal communities. Connecticut's coast is home to 60% of its population.
- The maritime sector accounts for nearly \$2.7 billion of gross state product and employs more than 30,000 state residents. These industries will be significantly affected if damage to ports from rising sea levels and environmental disasters occurs at projected levels.
- According to the Federal Emergency Management Agency, approximately 32,000 homes along Connecticut's 100-year floodplain are likely to be jeopardized by climate change. This places the state in a position to lose over \$18 billion in property damage and business interruption.

- Should nationwide adoption of green energy legislative policies be implemented, Connecticut could see an introduction of almost 17,000 jobs in clean energy and green technology industries and an increase of \$2 billion in state revenue.

## Delaware:

- According to the National Oceanic and Atmospheric Administration, Delaware is categorized as an entirely coastal state. This potentially places the livelihoods and lifestyles of all Delawareans and state visitors in the path of an already rising sea. Delaware's 381 miles of shoreline welcome thousands of beach-goers, boaters and fishermen each year.
- Nearly one of every 12 private sector employees in Delaware owes their job to the tourism sector. When expanded to include indirect employment, this number grows to roughly one in 10. Climate-induced losses within such a crucial industry pose a serious economic risk.
- Increased shore erosion can further exacerbate flood damages by removing protective dunes, beaches, and wetlands. Their removal exposes formerly protected properties to the water's edge.
- Rehoboth Bay's Big Piney Island was subjected to erosion rates of 30 feet per year from 1968-1981—it now no longer exists.
- Investments in clean energy could create almost 6,000 jobs for Delawareans—particularly significant in the current economic climate.

## Florida:

- As early as 2025, Florida will likely see economic losses of at least \$27 billion each year as a result of unmitigated climate change. This equates to over \$3,100 per household.
- Compared to other states, Florida faces the greatest threat from rising sea levels. The warming, rising waters of the Atlantic Ocean and the Gulf of Mexico place much of the infrastructure and 10.5 million people along Florida's 1,300 miles of coastline in jeopardy.
- Nearly one in five members of Florida's labor force—those in certain food and beverage industries, transportation sectors, real estate, leisure and hospitality—will be significantly affected by global warming.
- The Everglades is the third largest national park in the contiguous 48 states. It is located in one of Florida's most vulnerable areas. The lowest lying lands are projected to be completely submerged by 2100, but the Everglades will lose land—and potentially much of its wildlife population—gradually throughout the century. It brings in \$120 million annually to the local economy.

- A national Renewable Energy Standard (RES) would yield great benefits for Floridians. Without such initiatives, jobs in the renewable electricity sector would number 2,500 by 2025. This number is projected to skyrocket with the implementation of a 25% national RES. Green jobs could reach 15,000 to 17,500 jobs in the same amount of time.

## Georgia:

- Four major interstates cross Georgia. Much of I-95 lies within five miles of the coast. In 2007, the state spent nearly 10% of its budget on transportation and maintenance. Pavement buckling due to intense heat or flooding would necessitate increased maintenance and cause major disruption. A 1% increase in maintenance expenditures could cost other sectors of the economy \$12 million.
- Fine particle pollution from coal-fired electric plants contributes to roughly 946 deaths, 837 hospitalizations and 1,352 heart attacks every year in Georgia.
- Just less than 20% of Georgia's labor force owes their job to an industry especially sensitive to climate change's projected effects.
- Georgia's rail system is one of the most extensive in the Southeast. It consists of 4,700 miles of tracks. However, increasingly frequent and severe precipitation and hurricanes are likely to cause damages to the system. This will likely raise the maintenance and operating costs.
- Georgia has the potential to reach \$4.6 billion in clean energy investments. This could likely generate 59,000 green jobs by 2016.

## Hawaii:

- Sand replenishment to protect Hawaii's coasts from a 20-inch rise in sea level could cost anywhere from \$340 million to \$6 billion.
- Rising temperatures and sea levels could threaten Hawaii's beautiful beaches and unique ecosystems. This could likely jeopardize the state's \$10.7 billion tourist industry.
- If potential tourists decide not to go to Hawaii because it is too hot, or the beaches or native plants and animals have disappeared, consequences for the state could be significant. In 2008, the direct and indirect impact of the statewide visitor industry equaled nearly 17% of the gross state product. The visitor industry generated 151,331 civilian jobs and over 21% of state taxes.
- Most of Hawaii's infrastructure—roads, bridges, docks, water supply systems, and hotels—is concentrated near the coasts. This makes it particularly vulnerable to rising sea levels and increasing storm frequency and intensity. The tourism industry relies heavily on transportation availability.

- Hawaii has begun experimenting with cold ocean water to provide unconventional air-conditioning. By using such a system to cool three of its buildings, the Natural Energy Laboratory of Hawaii saves up to \$4,000 a month.

## Idaho:

- The Eastern Snake River Plane Aquifer has decreased in size over the past decade. The state has legislated funds to help pay for the \$100 million replenishment of this aquifer, but 70% of the costs will be paid by water users.
- By the 2040s, elevated temperatures are expected to decrease snowpack in the Cascade Mountains by up to 40%. This is likely to lead to seasonal water shortages and droughts.
- Potato yields, a source of Idahoan pride, could drop by 18%—an annual loss of over \$141 million to the gross state product. Furthermore, potatoes are an irrigated crop. As competition for water and the regularity of summer droughts rise, production costs will, too.
- Hunting, angling, and wildlife viewing generate about \$2.2 billion each year and support 37,000 jobs across the state. The state's natural ecosystems are likely to be harmed by the effects of climate change. The families these industries employ, as well as the families they service, are likely to suffer.
- If Idaho dedicated just one square mile to solar power, enough energy would be created to power 1,300 households for an entire year. The state has passed a 40% income tax break for Idahoans who use solar panels.

## Illinois:

- The agriculture industry is expected to experience more flooding, increased pests and pathogens, and increased heat stress. This could cost the state as much as \$41.46 billion in annual losses.
- Temperatures reached 106°F and killed over 500 during a July 1995 5-day Chicago heat wave. If climate change goes unmitigated, temperatures this high could become the norm toward the end of the century. Each summer, Chicago could experience as many as 30 days with temperatures of 100°F or greater and at least two heat waves like that of 1995.
- The manufacturing industry employs over 680,000 workers. It will be negatively impacted as falling water levels necessitate dredging along the Great Lakes-St. Lawrence shipping route. Costs are projected to reach \$92-154 million annually by 2030.
- Milder winters will allow for a longer growing season. An increase in spring and fall flooding and a rise in pest infiltration could make it nearly impossible for farmers to take advantage of this. Compared to 30-year averages, a 4.5°F increase in temperature coupled

with a 7% increase in precipitation would cost the Midwest \$9.3 billion each year in lost agricultural profits.

- If 50,000 MWh of new wind energy is created nationally, Illinois could create up to 8,530 jobs in manufacturing and realize \$2.84 billion in investment.

## Indiana:

- Manufacturing and related industries, and the agricultural, forestry, fishing, and hunting, leisure and hospitality sectors, are most at risk from climate change. These industries made up over a third of Indiana's 2008 gross state product.
- Electricity costs would likely rise in the event of climate change mitigating legislation. Hoosiers currently pay some of the lowest electricity prices in the country, but at a cost to their livelihoods and well-being. One study found pollution from power plants to be responsible for nearly 900 deaths, 845 hospital admissions and just shy of 1,500 heart attacks in Indiana each year. A majority of these could be avoided given a reduction in fine particle emissions.
- Climate change is likely to directly affect one in four members of the Indianan labor force.
- Runoff and lake contamination already plague the Great Lakes. Heavier rainfall will increase contamination levels and jeopardize Indiana's tourism industry. Tourism is responsible for generating \$9 billion each year. Coastal real estate values vary directly with water quality. If Lake Michigan's waters become increasingly contaminated, property values will likely fall.
- In 2007, at least 10% of Hoosiers were employed in trades that will be critical to the future production of green technologies, such as wind and solar power.

## Iowa:

- The insurance industry may be affected by the projected increase in floods. Out of fear of bankruptcy, the industry has become one of the most vocal proponents for cutting carbon emissions. The insurance industry in Iowa accounts for about 7% of gross state product and over \$3 billion in wages.
- Pests and diseases increasingly threaten the 2.1 million acres of timberland as temperatures continue to rise. This places the natural habitats and ecosystems at risk. This, in turn, will affect the pastimes of roughly 1.9 million hunters, anglers, and wildlife viewers.
- Over 1 in 10 employed Iowans owe their job to an industry especially sensitive to climate change.

- Winters and springs in Iowa could become up to 30% wetter over the next few decades. This could cause extreme events like the 2008 flood to become more common. The 2008 flood destroyed \$4 billion worth of crops throughout the state.
- An increase in energy efficiency of just 1.5% annually could generate \$68-90 million in cost savings throughout the state by 2030. This equates to as much as \$74 per household. It could create nearly 3,500 new jobs.

## Kansas:

- If temperatures increase by 9°F and precipitation decreases by 1%—a possible scenario, western Kansas could see \$290 million in crop losses by 2035. A ripple effect could cost an additional \$169 million and 1,400 jobs elsewhere in the state economy.
- Coal provides about three-quarters of the state’s electricity needs. Air pollution and rising temperatures contribute to ground level ozone. Ground level ozone exacerbates asthma and other respiratory diseases. Asthma alone cost Kansas over \$220 million in 2004.
- Flooding now costs Kansas about \$33 million in damages each year. By 2032, increased destructive flooding could cost the state nearly \$150 million and 700 jobs per year.
- Tornadoes currently cost Kansas about \$120 million per year. Hail cost an additional \$46 million. If climate change increases the damages of each by just 1%, the increase could cumulatively cost the state an extra \$66 million by 2050.
- Kansas has the capacity to produce 33 times its electrical needs through renewable sources. Kansas could create new jobs and improve the health of residents by exploiting these resources. While jobs overall declined 0.3% overall in the state from 1998-2007, clean energy jobs grew by 51%.

## Kentucky:

- The Environmental Protection Agency warns that climate change could reduce wooded areas of Kentucky by as much as 25%. This would harm a staple industry. Wood-based sectors in Kentucky generate roughly \$9.3 billion in revenue and employ approximately one out of every nine manufacturing workers in the state.
- Fine particle pollution emitted from coal-fired electric plants contributes to 745 premature deaths, 639 hospitalizations, and 1,022 heart attacks in Kentucky each year. Pollution is also a financial burden. The Commonwealth has the potential to save \$3.5 billion should it replace the 482,654 tons of sulfur dioxide emissions from coal-fired electric power plants with clean energy.

- Forest degradation and disruptions to natural ecosystems threaten the hunting, fishing and wildlife viewing sectors. This outdoor recreation generates roughly 20% of the tourism industry revenue. It employs about 41,700.
- Extreme weather events such as floods and droughts could become increasingly common as a result of climate change. This could likely increase costs for the state.
- Energy reform in Kentucky could reduce energy costs by \$1.2 billion annually in 2020 and by \$2.2 billion annually in 2030. This could save over \$500 annually for every state resident by 2030.

## Louisiana:

- Louisiana’s iconic crawfish industry is a major economic asset to the state; it brings in \$2 billion and supports 50,000-70,000 jobs in the state. The threat of increased diseases jeopardizes the industry and the number of jobs it creates.
- Almost half of Louisianans live in a coastal region. The coastal population is especially vulnerable to rising seas and intensified and more frequent severe weather.
- Louisiana’s low-lying coast—including New Orleans—could all be underwater by 2100 due to rising sea levels. This would likely harm crucial industries like the booming tourism and shipping industries. The New Orleans port alone is responsible for 160,500 jobs and \$17 billion of spending in Louisiana. During this past century, Louisiana’s coastal wetlands lost 1.2 million acres. The state is currently losing its wetlands at a rate of 24 square miles annually. This is comparable to losing a football field worth of land every half hour.
- The timber industry, in particular, is at risk from a 30% increase in forest fires by mid-century and a rise in pest outbreaks. Pine beetle infestations have significantly impacted timber output. Annual costs have reached as much as \$237 million. Losses due to infestation are expected to increase more than four-fold due to climate change.
- Implementing initiatives to promote the use of renewable energy resources could create up to 22,000 jobs. It could yield Louisiana households up to \$1,582 per year in extra income.

## Maine:

- By late century, Maine’s sea levels could rise by one foot. At this time, a coastal storm would place 260 York County businesses and \$41.6 million in wages at risk—assuming that those along Route 1 had not already been flooded and forced to evacuate.
- More than half of the country’s annual lobster catch comes through Maine. Studies have shown lobsters in warmer waters are more prone to disease. Climate change could significantly harm this iconic industry. It brings in roughly \$500 million to coastal areas.

- An estimated 13% of the Maine workforce is threatened the effects of climate change. This equates to over 1 in ten jobs.
- A popular “vacationland,” Maine has a year-round flow of tourists. Incredibly damaging “100-year” coastal storms like the 2007 Patriots’ Day storm are currently rare. Unmitigated climate change could cause such events to occur every two to three years in the Northeast. If the six hurricanes that hit the Northeast coast between 1935 and 1960 made landfall today, the region would see \$55 billion in damages. This does not include damage to local ecosystems, recreational activities, and tourism.
- Since it has no fossil fuel reserves, Maine is dependent on imports and vulnerable to fluctuations in supply and price. By developing Maine’s full wind potential, the state could create enough electricity to power around 8.8 million homes. This would leave plenty of electricity for export and industrial needs. Maine has approximately 500,000 homes.

## Maryland:

- Rising seas and incidences of severe weather place Baltimore port activities in jeopardy. Between now and 2018, a decrease in shipping activity of only 1% at the Port of Baltimore will indirectly cost Maryland’s gross state product about \$361 million. Job losses would reach 3,600.
- Crab and crab cakes have long been a staple in Maryland and a must-have for any state visitor. But crab populations will be affected by increases in salinity that their ecosystems will likely experience. Perhaps evidence of this already exists. The value of annual harvests of soft shell blue crabs from Maryland and Virginia has decreased by 41% since the late 1990s.
- Forestry is Maryland’s 5<sup>th</sup> largest industry and western Maryland’s number one source of income. It provides 18,000 jobs and generates nearly \$2.5 billion yearly. A 1% decrease in harvestable trees by 2018 would result in a loss of over 1,500 jobs and \$236 million from Maryland’s gross state product.
- Many of Maryland’s coastal marshes and beaches have already been inundated by rising seas. At least 13 Chesapeake Bay islands have disappeared underwater in the last hundred years. Many more in the Bay and farther offshore are likely to face the same fate.
- Maryland could see \$485 million in new capital investment and \$8 million in additional local tax revenues by developing a green economy. If a national renewable electricity standard required carbon emissions to be cut by 20% by 2020 Marylanders would save millions. In 2030, \$120 million of savings could benefit households. This would translate to a savings of over \$60 per household.

## Massachusetts:

- The coast of Massachusetts contributes about 37% of the annual gross state product. It employs more than 1 in 3 people. If sea levels continue to rise at their current rate, more than 5% of the Bay State’s coastal communities will be underwater by the end of this century. These communities include Gloucester and Marshfield.
- Massachusetts’ densely populated coastal region could see intensified coastal flooding and property damage. Major insurers have already refused to cover thousands of homeowners in the region. The coast of Massachusetts is home to one third of the state’s total population.
- Heavy rains and flooding, which caused significant damage in 2006, 2007, and 2010, are expected to increase under any emissions scenario.
- “100-year” floods—like the sort that led the president to declare Massachusetts a disaster area in the spring of 2010—may hit Boston every two or three years by mid-century.
- Recent studies show that the savings from greenhouse gas reduction measures will, in time, exceed the costs of their implementation. For example, the high-efficiency Fidelity Bank building in Leominster was built to use 31% less energy than other office buildings of the same size. Upgrades cost \$100,600. They will pay for themselves in less than four years. Energy savings are projected to reach \$27,600 per year.

## Michigan:

- Water levels in the Great Lakes are projected to fall by about a meter in Lakes Michigan and Huron over the next several decades. As a result, system connectivity throughout the Great Lakes will be placed at risk. By 2030, connectivity could fall by approximately 25%. This would be highly damaging to regional economies. Cargo transported through this system is valued at over \$3 billion in regional business and personal revenue.
- The increase in rainfall during the colder months will likely have a detrimental effect the sport winter sport season, particularly snowmobiling. Michigan is home to over 36,000 miles of snowmobile land and track and nearly 365,000 registered snowmobiles. This winter sport alone brings in over \$1 billion to the state. It is difficult—and would be expensive—to disperse man-made snow across the expansive tracks.
- Climate change will be detrimental to Michigan’s economic security. It will harm some of its highest-grossing industries such as manufacturing, wholesale and retail trade, and tourism. An estimated 38% of Michigan’s labor force will be directly affected by unmitigated climate change.
- Warmer temperatures, lost soil moisture and drought will likely have a significant effect on Michigan’s agriculture industry. Michigan’s agriculture sector is valued at \$63.7 billion. The predicted 20-40% increase in precipitation in the region is likely to further hinder this

sector. The precipitation increase will likely come in the form of severe storms. This will make higher rates of flooding and the contamination surface water more likely.

- In 2008, the state imported all of its coal. It sent \$1.36 billion out of state. This made Michigan the 7<sup>th</sup> highest spender on net imports of coal in the nation. Roughly 1.6 times Michigan's current electricity demand could be generated by renewable sources of energy found in-state. Projections show that by 2020, a 10% renewable electricity standard would create over 2,700 jobs.

## Minnesota:

- Every year, wildlife-related activities attract nearly 3 million people and contribute over \$4 billion to Minnesota's economy. Climate change, however, poses a serious threat to Minnesota's numerous natural ecosystems. Trout, for example, could lose 50-100% of their stream habitat due to climate change over the next 50 years. Minnesota's moose population faces a similar fate.
- Western Minnesota experienced its worst natural disaster in modern times when the Red River rose to record levels in 1997. More than 60,000 people were forced to evacuate the flooded areas. It was the largest displacement of an American urban area prior to Hurricane Katrina. The Red River valley has flooded three times since 1997. Despite the characterization of the 1997 flood as a "100-year" flood, the flood of 2009 matched it in damage.
- Outdoor enthusiasts add nearly \$10 billion to the state's economy and support over 70,000 jobs. The value of these activities goes well beyond the economics of recreation, however. They make up a significant piece of Minnesota's cultural identity.
- The benefits of longer growing seasons are likely to be negated by severe weather events, pests, and warmer temperatures. Crop yields are likely to fall as a result of these events. This would negatively impact Minnesota's \$13.3 billion agriculture industry. In addition, Minnesota's forested areas could decline by 50-70% by the end of the century. This would deal a severe economic blow to the forestry industry. The forestry industry is the 4<sup>th</sup> largest manufacturing employer.
- A renewable energy standard of 20% by 2020 in Minnesota would create 3,100 jobs and attract \$1.8 billion worth of new capital investment. It would generate \$332 million in aggregate income for Minnesota farmers and rural landowners.

## Mississippi:

- Wild marine species in the Gulf are threatened by climate change. The maximum catch potential in Mississippi is anticipated to fall 20% below the 2000s levels by 2055.
- By 2080, southern Mississippi could see as many as 150 days reaching 90 degrees or higher each year. This will exacerbate asthma and other health conditions. Warmer, wetter weather could also help spread malaria and other mosquito-borne diseases.
- Nearly one in four employed Mississippians work in an industry sensitive to climate change. For example, Mississippi is located near the center of the Gulf Coast region's integrated network of roads, ports, and rail lines which support wholesale trade, transportation, and warehousing industries. These sectors account for nearly 130,000 jobs statewide.
- Mississippi currently lacks the infrastructure to weather the projected effects of climate change. The nearly \$2.5 billion gaming industry, for example, is clustered on vulnerable docksides and other lowlands along the Mississippi River and Gulf Coast. In 2005, Hurricane Katrina wreaked havoc on Mississippi's Gulf Coast casinos. This cost \$500,000 per day in tax revenue during the aftermath.
- Mississippi's clean energy employment level grew at seven times the state average between 1998 and 2007. It now provides approximated 3,200 jobs in the state. This suggests that increasing renewable sources to 20% of the state's energy portfolio by 2020 could potentially support over 20,000 jobs within Mississippi.

## Missouri:

- Agriculture brought nearly \$7.7 billion to the state in 2009. Soybeans, the state's largest crop, account for nearly 26% of the state's crop production. Corn is a close second at 18%. Between 1961 and 1990, St. Louis experienced a 90°F for a third of its summer days. This number could double or even triple by the end of the century. The essential corn and soybean crops may be unable to survive Missouri's new climate if projections are correct.
- Increased flooding and other weather extremes threaten fishing, hunting, and wildlife viewing. This places roughly 57,000 jobs and \$3 billion in income at stake, not to mention a favored pastime.
- Roughly 11% of the workforce—one in 10 jobs—in Missouri is projected to be directly affected by climate change.

- The 2008 floods in Missouri caused \$900 million in damages. Increased winter precipitation caused by climate change could make Missouri susceptible to more such events. Less summer rainfall, in turn, could increase the number of seasonal droughts in Missouri. The 2002 drought cost the state \$460 million.
- If Missouri adopts a renewable energy standard of 20% by 2020, it could see up to 2,700 new jobs. It could gain gas and electricity savings of \$264 million by 2030. This equates to saving of \$120 per household. Missouri could also see \$327 million in new renewable energy investment. Landowners who produce biofuel or lease their property to wind developers could earn \$298 million.

## Montana:

- Agriculture in Montana's is worth \$2.4 billion. The sector is expected to lose up to \$79 million a year to climate change by 2050.
- In 2007, Glacier National Park generated over \$101 million for the local economy. However, of the 150 original glaciers that gave the park its name, only 27 remain large enough to be considered glaciers. The park has already lost 82% of its ice fields. Scientists predict that the park will be completely devoid of glaciers by 2022.
- Over one in ten members of the Montanan labor force are employed in an industry especially sensitive to climate change.
- In 2008, Montanans spent \$50 million fighting wildfires. The state faces a 175% increase in wildfire burn areas due to increasing global temperatures and drier lands.
- Leasing just 20 acres of land to wind energy producers, about 1% of a typical Montana farm, can earn the renter more than \$100,000.

## Nebraska:

- Corn and soybean crop yields could decline by as much as 17% as temperatures increase during the growing season. This would harm Nebraska's agricultural sector, which is currently worth over \$7 billion. Additionally, the state could lose as much as \$17 million annually from reduced beef production by 2040.
- The health of Nebraskans will be at risk from heat-related deaths and an increase in insect-borne diseases. Analysts predict that warmer temperatures may cause a rise in the incidence of the West Nile virus and increase the lifespan of mosquitoes carrying malaria and Lyme disease-carrying ticks.

- Deforestation and water shortages will negatively affect hunting, fishing, and wildlife viewing. These sectors brought in \$514 million and created almost 12,000 jobs in 2006. Livestock and wild animals are sensitive to rising temperatures and its associated effects. It is likely their populations would decline in numbers.
- Nebraska's \$15.3 billion agricultural industry relies heavily on irrigation, which is already stretched to the limit. Nebraska is already home to the largest area of irrigated land in the country, and drier summers will threaten crops and increase the demand for irrigation. Water is currently being pumped from the High Plains (or the Ogallala Aquifer as it is also known), which provides drinking water to 80% of the Great Plains population, faster than it can replenish.
- With comprehensive energy legislation, jobs in the clean energy economy could reach as high as 38,000 in Nebraska by 2020.

## Nevada:

- Two million people in Nevada depend on Lake Mead for daily water consumption. There is a 50% chance that this critical lake will be dry by 2050 due to climate change. There is a 10% chance that it will dry up as soon as 2021. This would leave 12-36 million people across the region without a dependable water supply.
- The Southern Nevada Water Authority explored decreasing development in order to deal with declining water supplies and found that holding construction related sectors at 65% of current levels would result in \$17 billion in collection losses for state and local governments over a 12-year period. Nevada's dilemma is that the continued growth—as is projected—places an unsustainable demand on the water supply system. Construction-related industries employ 17% of the state's workforce.
- Strained water sources could cause tourism to fall in Nevada. A 3% decrease in the number of visitors to Nevada will likely result in an indirect loss of \$323 million in hotel expenditures and an additional \$332 million in restaurant losses.
- Nearly 70% of Nevada's workforce, those employed in the construction, tourism, and agriculture industries, is projected to be directly affected by the effects of the changing climate.
- Nevada's renewable energy capacity, 169 million MWh, is over five times the state's current annual usage of 32 million MWh, leaving Nevada with the ability to export energy for profit.

## New Hampshire:

- Climate change, ecosystem degradation, and rising sea levels could seriously affect New Hampshire's \$4.3 billion tourism industry. Timberlands make up 84% of New Hampshire's landscape. Climate conditions in a high-emissions scenario are expected to reduce the state's forested area—threatening spruce and fir trees essential to paper production—beech and birch forests, and maple trees. Fewer tourists can have a ripple effect that will reduce the viability of other tourism-dependent industries. This includes hotels, food service, retail, construction, real estate, and entertainment.
- Climate change has the potential to devastate the iconic model of American winter recreation. Warmer temperatures and high greenhouse gas emissions will cause New Hampshire's snow season to shrink by about 50%, significantly impacting the ski industry.
- An estimated one in 10 members of New Hampshire's labor force is employed in an industry especially sensitive to climate change.
- Historically, New Hampshire experiences a drought once every two to three years. The changing climate could cause annual droughts for the state. Increases in pests and weeds and warmer temperatures will likely damage the state's agriculture sector.
- Monthly energy costs for the average family could decrease with the introduction of more clean energy options. Savings of \$5.82 on energy bills and \$21.86 on fuel costs each month would provide long-term benefits to state residents. Moreover, green jobs typically pay at a higher rate than jobs in other sectors. As of 2009, New Hampshire workers employed in the green economy were earning an average of \$54,400. This is 23% more than the average annual income in the state.

## New Jersey:

- Local trends suggest the sea level around New Jersey will rise nearly 1.5 inches by 2020 and nearly half a foot, by 2050. The sea level around New Jersey has already risen at nearly twice the global rate over the past century. Every inch of increase translates to roughly six lost feet of shoreline, far more than the national average. Based on a one to three foot rise in sea level, the Environmental Protection Agency estimates a cost of \$160-790 million just to protect the residents of Long Beach Island. This translates to roughly \$9-44 million to protect each mile of shoreline—an estimated total of \$1.9-9.2 billion if extrapolated to the entire 210-mile New Jersey shoreline.

- Climate change severely threatens New Jersey's coastal development. New Jersey's coast is home to 60% of state residents, boasting over \$100 billion in land and property values. A \$30 billion per year tourism industry is concentrated in just four shoreline counties.
- A mere 1% decrease in visitors to New Jersey annually would cost the state an estimated 40,000 jobs and \$3.7 billion in indirect costs by 2017.
- Approximately 6% of New Jersey's workers commute to New York City. Most of the bridges, tunnels, and rail lines connecting New Jersey with New York City "operate below, at, or near sea level," making flooding a likely and expensive proposition. Recovery following a major flood is estimated to exceed \$1 billion. This does not include the business losses incurred by hundreds of thousands of workers being stranded away from their jobs.
- Robust investment in green energy not only promises significant reductions in New Jersey's greenhouse gas emissions, but is projected to create between 20,000 and 48,000 new jobs.

## New Mexico:

- New Mexico's farming industry brings in approximately \$1.6 billion to the state each year. Should climate change continue unmitigated, by 2020, the state will lose an estimated \$73 million annually from reduced food and agricultural production. Water shortages could cause the total amount of farmed acres in New Mexico to fall by as much as 25%. Throughout the West, the value of farmland is projected to decrease by about 36% due to diminished water supplies. This translates to a loss of \$1,700 for each New Mexican farm.
- Fueled by severe drought conditions, wildfires are expected to be more catastrophic. Frequent and intense wildfires are projected to cost the state \$488 million each year. Loss of forest landscape will likely lead to diminished populations of animals and wildlife. This could have serious repercussions for the state's natural ecosystem.
- Climate change is projected to cost New Mexico \$3.2 billion each year by 2020. Wildfires, health-related costs, and losses in the recreation sector make up a large fraction of these losses. This figure equates to a loss of \$3,430 per household, or an average of more than 8% of a median New Mexican household income.
- Over one in ten members of New Mexico's workforce are employed in an industry especially sensitive to climate change.
- New Mexico has the potential to generate more than eight times its total electricity needs through the use of wind power. Not only can the state reduce the effects of climate change by recreating its energy profile, it can also benefit economically from green energy policies.

A nationwide green economic recovery project could potentially create over 13,500 jobs in New Mexico.

## New York:

- Conservatively, climate change-sensitive industries account for 290,000 jobs and \$77 billion in profits annually in New York.
- Shorter, warmer, and slushier winters threaten winter favorites like skiing and snowmobiling, which contribute approximately \$4 billion and 10,000 jobs to New York's economy.
- Hunting, angling, and wildlife viewing opportunities will decline as wetlands disappear; Adirondack spruce, fir, and hemlock forests shrink; and coastal waters warm. The jobs of nearly 70,000 New Yorkers who work in industries vulnerable to these changes, such as hunting, fishing, wood and paper products, and wildlife-related tourism, are also at stake.
- Nor'easters pose the greatest threat to the New York City metropolitan region. Less frequent, but potentially more damaging, hurricanes also threaten the area. The United States Army Corps of Engineers estimates that a Category 3 hurricane would flood nearly a third of lower Manhattan. The total storm damages to the New York metropolitan area would likely cost \$200 billion or more. This is an amount equivalent to about \$1,750 for every household in the United States.
- New York has the potential to generate over 80% of its electricity from renewable sources, and a clean energy push could generate nearly 110,000 jobs statewide.

## North Carolina:

- The iconic Outer Banks are visited by thousands of tourists each year, but beginning in 2030, spending by out-of-state tourists will fall 16% each year, dropping by 48% each year as of 2080.
- The state's wildlife and associated industries are a major source of revenue. In 2006, nearly 3.4 million people spent more than \$2.7 billion in North Carolina. This in turn supported nearly 55,000 jobs in the sector. The projected increase in global temperatures will endanger animal habitats, resulting in fewer opportunities for hunters, anglers and wildlife viewers—and a loss of tourism revenue.
- Global climate change threatens to devastate the state's agricultural and farming industries, leaving North Carolinians desperate to recover lost revenue. North Carolina's agriculture

industry is responsible for producing \$70 billion, or 18% of the state's income. It employs 17% of the state's workforce. Agricultural profits for North Carolina are estimated to drop 22.6% due to erratic precipitation, increased global temperatures, and pests. The beetle outbreak in 2001 cost nearly \$1 billion in lost lumber yields and an additional \$723 million in indirect costs. The state's 2002 drought cost the industry another \$398 million and affected over 4,300 jobs.

- North Carolina's beaches will be severely affected by rising sea levels, which are projected to rise between 19 and 32 inches by the end of the century. Losses related to the southernmost beaches alone will reach an estimated \$93 million annually by 2030—\$223 million a year by 2080.
- North Carolina is poised to receive \$4.3 billion in green energy investments, which will create around 51,000 new jobs for state residents, providing jobs for over one in ten unemployed North Carolinians.

## North Dakota:

- Pestilence and plant disease cost farmers over \$170 million in 2005. Climate change could reduce wetlands in the Prairie Pothole Region and some areas of the northern Great Plains by a drastic 91% before 2080. This would wipe out wildlife that supports the state's hunting and fishing industries.
- Droughts have the propensity to affect the agricultural industry, which accounts for just less than 11% of the gross state product and nearly 22,300 jobs. Overall, it is estimated that 14% of all North Dakota jobs will be affected by changes in climate.
- Climate change will likely increase the frequency and intensity of droughts, which could cost North Dakota millions, if not billions, of dollars. Flooding in 2004 destroyed 679 housing units. Flooding in 2002 cost the state \$2.35 million in damage to roads and other infrastructure.
- North Dakota could potentially generate over 1.2 trillion kWh of electricity annually using wind resources alone—more than enough to provide power to a quarter of the country. In addition, implementing a 20% renewable electricity standard by 2020 could create 3,680 new jobs and attract \$617 million in capital investment. It could reduce electricity and natural gas bills by \$22 million.

## Ohio:

- If shipping activity in Ohio decreases each year by 2% due to increasingly limited transportation capacity due to climate change, Ohio's economy is projected to lose \$5.5 billion within a 10-year period.
- Ohio is currently ranked 8<sup>th</sup> in the nation for corn production, and in 2007, corn production accounted for \$1.5 billion of the state economy. Increased temperatures in 2002 alone resulted in the loss of one-third of the state's average corn yield. More protracted periods of drought due to climate change will likely damage Ohio's agricultural industry by reducing crop yields.
- Asthma attacks already account for nearly 44% of all emergency room visits in children under the age of 19, costing families both time and money. Rising ozone levels pose a serious threat to the more than 9% of Ohio's population who suffer from asthma.
- An estimated that 39% of all Ohio jobs will be affected by changes in climate.
- The most recurrent and costly natural disaster in Ohio is flooding. During the 1990s, it saddled the state with \$572 million in emergency costs. Scientists project that Cincinnati alone will experience a 30% increase in heavy rainfall by 2040 due to climate change.
- Ohio could reinvigorate overall job growth and retention, which has stalled in recent years. Ohio is uniquely poised to benefit from wind turbine manufacturing. The state could gain over 11,500 new jobs and \$3.9 billion in investment in this industry alone, should a national standard be implemented.

## Oklahoma:

- Oklahoma is the 3<sup>rd</sup> largest wheat producer and 5<sup>th</sup> largest cattle producer in the nation. As temperatures increase beyond the crop's standard temperature range, Oklahoma could likely see a decline in wheat yields by 27-37%. Oklahoma is also projected to face a 10% decline in livestock yields.
- With climate change, Oklahoma is likely to experience more costly droughts. The severe 1998 drought was estimated to cost the state around \$2 billion.
- Roughly 75% of Oklahoma is dedicated to farmland. As a result, the state and its farmers depend heavily on access to freshwater. Current water use is unsustainable since the groundwater supply, notably in the High Plains aquifer, is being tapped faster than the

replenishing rate. Longer periods of drought and quicker evaporation rates, caused by climate change, are likely to further diminish a shrinking supply of freshwater.

- An estimated 17%—nearly one in five—of all Oklahoma’s jobs will be affected by changes in climate.
- The Panhandle region alone could realize \$12 billion in capital investment in wind energy. Oklahoma could generate more than 8,400 MW of wind energy. It could yield \$1.2 billion in wind-generated electricity annually. Oklahoma has the potential to produce 17 times the state’s electricity needs (9% of the entire country’s electricity needs) using wind energy.

## Oregon:

- Oregon could see a 60% increase in burned timberland acreage by the 2020s. This would create significant losses to Oregon’s roughly \$1.26 billion forest industry. Costs associated with wildfires suppression could reach \$64-102 million per year by the 2020s and \$88-141 million by the 2040s.
- Deaths from asthma in Oregon are predicted to increase 20% in the next 10 years due to climate change.
- Projected reductions in snowpack could reduce summer stream flows by up to 50% in some areas of Oregon by 2050. In Portland alone, models estimate that this will reduce water availability by 1.5 gallons; demand is projected to rise by 2.8 billion gallons by this same time. The city will likely experience a 4.3 billion gallon water shortage.
- Overall, it is estimated that 20% of all Oregon jobs will be affected by these changes in climate. Oregon’s snow-based recreation sector employs over 10,000 workers and contributes over \$200 million to the state’s economy each year. In 2005, many mountain resorts closed due to insufficient snow. Climate change will make this problem worse.
- Severe weather events, like the winter storms of 2006-2007, are also likely to occur more frequently in a warmer global climate. That winter, winds of up to 129 mph and flooding of up to 21 feet caused over \$100 million in commercial and homeowner property damage.
- Green industry development would also allow Oregon to mitigate the effects of the global financial crisis. The state is poised to receive nearly \$1.8 billion and create 21,000 jobs due to increased clean energy investment. Expanding solar capacity by 30% throughout the United States would create 1,193 new Oregon jobs and attract \$960 million in investments to the state.

## Pennsylvania:

- Pennsylvania has the fourth-highest total in losses from flooding in the country. Flooding in Pennsylvania cost more than \$100 million in June 2006 alone. Heavier precipitation due to climate change is likely to increase incidences of flooding. This would cause billions of dollars in damage.
- Rising ocean water will increasingly intrude into the Delaware River, threatening Philadelphia's drinking water.
- Climate change directly threatens 56,000 Pennsylvania jobs and \$5.5 billion in annual income generated by hunting, fishing, and wildlife watching industries.
- The dairy industry stands to lose upwards of \$480 million in milk productivity due to rising temperatures.
- Pennsylvania currently ranks third among states in clean energy jobs. Clean energy investments will benefit over 553,000 workers through wage increases or new jobs.

## Rhode Island:

- The Environmental Protection Agency estimates that it could cost Rhode Island between \$90-530 million by the end of the century to protect its coastline from rising sea levels.
- Rhode Island is likely to be victimized by stronger hurricanes. This could potentially impact over half the state and cause billions of dollars in damages. The impact of climate change on just the port of Providence could directly impact manufacturing and trade in Rhode Island. This sector currently accounts for 25% of the state's \$45 billion in annual earnings.
- Projected water shortages have dangerous implications for Rhode Islanders, as 35% of households in the state depend on wells for drinking water.
- Rising ozone levels pose a serious risk to the nearly 19,000 children and 75,400 adults suffering from asthma in Rhode Island.
- Droughts, flooding, and changes in seasonal temperatures—especially during the growing season—are likely to damage Rhode Island's \$90 million agricultural sector.

- Clean energy investments and expanded green technology industries are expected to create more than 5,000 jobs in Rhode Island. Increase investment revenue is likely to rise by over \$500 million.

## South Carolina:

- Elevating South Carolina's coastal roads, streets, and bridges by 20 inches to avoid flooding sea waters is expected to cost at least \$4.2 billion. Rising waters will also necessitate billions of dollars for sand replenishment. South Carolina's ports will likely have to implement several readjustment projects, potentially costing tens of billions of dollars.
- Climate change is expected to enhance the destructive capabilities of hurricanes and tropical storms. As a result, insurance companies are already becoming increasingly nervous about insuring coastal properties. Homeowner insurance premiums in South Carolina increased 56.4% from 2001-2007.
- Climate change will likely devastate both the agriculture and forestry industries. These sectors employ approximately 115,000 and 84,000 South Carolinians, respectively. Rising temperatures could exceed the tolerance of soybean and wheat crops; annual yields are expected to fall by 42%.
- South Carolinians employed in the tourism, recreation, agriculture, and forestry industries will be disproportionately affected by climate change.
- Investment in clean energy would produce approximately 3.5 more jobs per dollar spent than equivalent investments in fossil fuel energy. The development of an offshore wind farm in southern South Carolina could create anywhere from 939 to 1,789 jobs and contribute \$47-96 million to the state's economy. Companies contracted to build wind turbines could hire approximately 5,000 South Carolinians and attract over \$1.65 billion in investments to the state.

## South Dakota:

- Agriculture makes up nearly 9.5% of South Dakota's gross state product. Combined with forestry and hunting, this industry employs 6.5% of the workforce and has a \$19 billion impact on the state's economy. Rising temperatures, limited water supplies, and increases in the prevalence of disease and pests threaten these sectors. Corn losses alone are projected to reach \$63 million annually.
- Warmer average summer temperatures are expected to cause lower groundwater and stream levels. This will put more pressure on the state's water resources.

- A changing climate will increase the frequency of droughts. This will significantly impact the water supply and exacerbate the negative economic impacts of climate change. The 2002 drought cost the state about \$1.4 billion. It caused \$642 million in farm losses.
- The state's hunting, fishing, and wildlife industries created 9,000 jobs and contributed more than \$499 million to the economy in 2006. However, climate change effects—like warmer temperatures and wildfires—threaten South Dakota's natural ecosystems, likely harming these sectors.
- South Dakota is the fourth largest potential producer of wind power in the U.S. It has the ability to generate over 1.0 trillion kWh of power—more than 50 times its current electricity production. This is enough to power more than 86 million homes. A 20% renewable energy standard by 2025 would create 1,250 new jobs and attract \$906 million in new capital investment.

## Tennessee:

- Rising temperatures and increased carbon dioxide levels will damage Tennessee's agricultural industry. Tennessean agriculture creates 347,000 jobs and generates \$51.4 billion in revenue. Soybean production made up nearly 30% of Tennessee's agricultural exports in 2009. Soybeans and corn crops are particularly vulnerable to climate change. For every 1°C increase in temperature, corn yields will decrease by an estimated 8.3%. For every increase of 1.2°C, soybean productions will decrease by 3.5%.
- Warmer temperatures will increase smog and ozone levels, increasing the incidence of asthma. More frequently occurring heat waves will compound the health risks. In 2006, asthma affected 750,000 Tennesseans, causing 192 deaths and costing roughly \$125.6 million.
- Increased susceptibility to droughts and wildfires due to increasing temperatures will change the composition of forests in Tennessee. This jeopardizes the \$21.7 billion forest industry which employs over 180,000 Tennesseans.
- Average temperatures in Tennessee are expected to rise by nearly 7°F by the end of the century. This will increase the likelihood of floods. The damage caused by the May 2010 Nashville flooding cost over \$1 billion. Rising temperatures threaten to make major floods like this more common.
- By investing in renewable energy, Tennessee could generate 15,600 new jobs and reduce energy costs by \$1.6 billion annually by 2020. By 2030, these numbers could rise to 21,500 and \$3.1 billion, respectively.

## Texas:

- Nearly one quarter of Texas' population and much of its economy depends on the coastline. The coast is host to more than half of U.S. chemical and petroleum production. Cargo worth over \$25 billion traverses the Texas segment of the Intercoastal Waterway each year. The coastal ecosystem contributes more than \$12 billion annually to the state economy. Without action, the Gulf Coast sea level is expected to rise one to three feet in the next 100 years. A rise by roughly two feet would displace 78% of the Galveston Bay region's households and cause a loss of \$9.3 billion in infrastructure.
- With the onset of climate change, hurricane intensity is projected to increase. Every rise of 1.8° F in sea surface temperature is projected to increase intensity by about 8%. As a result, by 2030 hurricane flood levels are projected to rise 3%-27%. Structural damage is expected to rise an average of 60-100%.
- A 3° F temperature increase could cause the number of heat related deaths in Dallas and Houston to increase from 28 to 60-75 each year. Increased heat will create more "ozone action" days, increasing the number of asthma attacks, hospitalizations, and overall health costs.
- The \$21 billion agriculture and livestock industry in Texas is likely to face hardship as harsher weather and longer, drier seasons become more frequent. The agricultural regions in the west and south of Texas will be affected by increased water scarcity. The state may need to shift its agricultural production to accommodate drier conditions. Net agricultural income could potentially fall by 16-29% within the next two decades.
- Texas has more renewable energy potential than any other state in the country, but it remains largely untapped. Without conflicting with food or feed production, biomass could provide around 15% of the state's demand for liquid fuel.

## Utah:

- In 2008, Utah's agricultural production and processing sectors contributed more than \$15 billion to the state's economy. It created nearly 66,500 jobs and provided \$2.4 billion to its employees. Between half and three-quarters of this sector is derived from livestock and livestock products. Rising temperatures will increase the incidence of livestock disease, cause a decline in dairy production, decrease reproduction rates, and reduce animal weight gain. Energy costs will rise to maintain the animals' environment. A failure to mitigate climate change will significantly depress yields from these sectors and negatively impact Utah's economy.

- Nine in ten Utah residents live in urban areas. Urbanites are more susceptible to the increased health problems associated with higher temperatures, water pollution, and flooding. Higher temperatures will also cause elevated ozone levels, increasing the occurrence and severity of asthma and other respiratory diseases.
- The tourism and recreation sectors make up about 6.5% of Utah's gross state product and support over 113,000 jobs. These jobs are extremely vulnerable to reduced snowfall. Utah's snow season is projected to fall to only two or three months by 2100. In Park City alone, the effects of climate change could cost the city as much as \$392.3 million in output, \$66.6 million in earnings, and 3,717 jobs by 2050.
- Utah is extremely vulnerable to drought. Nearly 80% of the state's water supply is from surface sources such as streams and rivers. Surface sources are expected to dry up. This will strain farmers' water supply. Faster evaporation rates and smaller snowpack will place more pressure on water supplies. Pests will also proliferate at greater rates. Between 1998 and 2002, water scarcity and pests cost an estimated \$400 million in farm and ranch losses.
- By achieving Jon Huntsman's energy efficiency plan for 2015 and increasing Utah's renewable energy sales to 20% by 2020, the state could create over 7,000 new jobs. It could contribute \$310 million in new earnings each year and increase Utah's gross state product by \$300 million.

## Vermont:

- Forests are particularly vulnerable to climate change. They cover over 78% of Vermont's landscape and are a crucial part of Vermont's income. Forest-related manufacturing, recreation, and tourism industries contribute over \$1.5 billion to the state's economy. Vermont's iconic maple syrup industry is also jeopardized by warmer temperatures.
- Less snowfall is predicted to seriously damage the winter recreation industry by 2050.
- It is estimated that 14% —over one in 10 jobs—of Vermont's labor force will be directly affected by changes in climate.
- Rising temperatures are likely to inflict heat stress on Vermont's livestock. The dairy and cattle industry generates over 75% of the gross farm income in Vermont. These industries already lose \$5.4 million annually, largely due to increased temperatures. Losses will likely increase as temperatures continue to rise.
- Vermont's only wind farm powers about 2,000 homes in southern Vermont. Further development of wind farms would stimulate the state's economy. It is estimated \$152

million would be spent on Vermont's goods and services. Wind farms would annually pay \$5.6 million in lease payments to homeowners and in state and local taxes.

## Virginia:

- Rising sea levels threaten to be costly for Virginia. Sand replenishment costs could reach as much as \$1.2 billion. Changes to Virginian beaches are likely to negatively affect the billion dollar tourist industry. Roughly \$200 million in aggregate income is generated by this industry.
- Rising sea levels, coupled with intensified hurricanes, are likely to make most of Virginia's coastal region uninsurable. As of June 2009, 55% of the mid-Atlantic insurance market refused to insure businesses and primary residences in the coastal region.
- Stronger hurricanes due to climate change have the potential to severely impact 1.5 million people, homes, and businesses along the coastline.
- One in ten Virginian jobs will likely be affected by changes in climate. For example, warmer water temperatures are likely to significantly alter the nearly \$2.1 billion wildlife-related industries. Trout populations could decrease by up to 61%. The sector's 50,000 jobs will likely be significantly impacted.
- A \$2.7 billion investment in Virginia's green sector could generate nearly 56,500 jobs.

## Washington:

- Climate change will cost Washington's economy at least \$3.8 billion per year by 2020. These costs will rise to \$6.5 billion a year by 2040 and \$12.9 billion annually by 2080.
- Washington's changing environment will affect its tourism sector. It is likely to disrupt natural ecosystems and cost the state millions. Hunting, fishing, and wildlife viewing attracted roughly 3 million people and \$2.3 billion in 2006, creating over 42,000 jobs.
- Companies like Microsoft, Boeing, Starbucks, and Nordstrom are all headquartered around Puget Sound. Rising sea levels may make the area less attractive as a business center.
- Higher temperatures will accelerate the production of low-altitude ozone in urban areas. This is detrimental to the health of Washingtonians. The cost of lost productivity will rise to \$1.2 billion a year by 2020 and \$1.9 billion each year by 2040 as a result. Washingtonians will also pay \$130 million a year by 2020 in health-related costs associated with heat waves. The number rises to \$300 million by 2040.

- Washington has already leveraged its business-friendly climate to attract a green-energy industry. Over 240 organizations have created nearly 8,400 jobs. Each job earns an average of \$60,000 annually and brings in over \$2.1 billion in revenue. This makes Washington's green industry even larger than its coffee and logging industries.

## West Virginia:

- Energy reform in West Virginia could reduce energy costs by \$900 million annually by 2020. Energy costs could drop by \$1.6 billion each year by 2030. This amounts to \$850 per West Virginian.
- West Virginia's forests cover 78% of the state and are at risk from the proliferation of pests, such as beetles and moths, and higher incidence of wildfires. Damage to West Virginia's forests would affect industries worth \$4 billion in sales and over \$45 million in taxes. It would impact over \$703 million in salaries for nearly 29,800 West Virginians.
- Damaged forests could impact industries such as hogging, wood furnishing, hunting, and tourism. For example, the fishing industry is worth \$179 million and employs over 2,000 people. It is vulnerable to declining trout populations caused by changing habitats. West Virginia's rolling Appalachian Mountains are home to six state forest preserves and 37 state parks. Climate change is a threat not only to the Mountain State's economy, but the rural lifestyle that West Virginia has preserved for years.
- Currently, the coal industry costs West Virginians nearly \$98 million each year.
- An investment of \$516 million in the green economy would likely yield over 12,100 jobs in West Virginia. With 68,000 unemployed workers, West Virginia is in need of these new jobs.

## Wisconsin:

- Increases in temperature are likely to cause the northernmost forests of many tree species to shift further north, damaging Wisconsin's \$18 billion forestry industry.
- Forested areas of the state are expected to be reduced by 55-70%. Floods are expected to occur more frequently. These events will disrupt wildlife, the state's ecosystems, and the tourism industry. Tourism and recreation generate nearly \$7 billion each year in gross income. In 2006, hunting, fishing, and wildlife viewing alone were responsible for employing more than 90,000 people and attracted 4.1 million tourists.

- Winter sports, including the famous American Birkebeiner ski race, are also threatened by climate change. Businesses associated with skiing, snowmobiling, and ice fishing could be hampered by lesser amounts of snow and diminishing levels of ice-cover on the state's lakes.
- Extreme heat is a threat to Wisconsin's economy. Higher temperatures are projected to cause heat stress for much of the state's livestock. Dairy cattle are particularly vulnerable to high temperatures. Milk production can decline when temperatures exceed 75°F. Under a higher-emissions scenario, dairy cattle and other livestock will suffer near-permanent heat stress during a typical Wisconsin summer by late century.
- Clean energy investments will create opportunities for welders, carpenters, electricians, operations managers, machinists, and industrial truck drivers. Wisconsin is home to more than 304,000 jobs which require the same skills as clean energy industries. The green industry could bring more of these jobs or wage increases.

## Wyoming:

- Tourism is the second largest industry in the state. Losing even a small percent of the landscape and wildlife would have severe repercussions. Travelers spent roughly \$2.7 billion in 2007, contributing \$108 million in 2007 to state and local taxes. Without this tax revenue, each household would have owed the state and localities \$527 more in taxes.
- A combination of pests and fires could reduce the white bark pine forests by as much as 90% in 50 years. These forests provide an important food source for many of the animals that make up Wyoming's unique landscape. Up to 50% of trout habitat in the Rocky Mountain region could be destroyed by the end of the century. A disruption to the state's ecosystems could harm Wyoming's wildlife-related industries. The industries support 16,105 jobs throughout the state.
- Warmer and drier summers threaten to increase the incidence of costly wildfires. The 1988 Yellowstone fire cost \$120 million to extinguish. Increasing fire severity and frequency will also increase the associated costs.
- Jobs in green industries grew 56.4% between 1998 and 2007. This is significantly higher than the 14% overall job growth rate during the same period. The state stands to benefit greatly from the push for increased green technology and energy throughout the United States. Wyoming is ranked 13<sup>th</sup> in wind power capacity. A greater investment in this sector could yield more jobs.

### [Congress turns a blind eye to climate science](#)

Washington Post, 4/12/2011

By Andrew Freedman

Last week was a bewildering one for those who recognize the abundance of compelling scientific evidence showing that the climate is changing mainly due to human activities and that these changes pose risks to human health and welfare. While the news cycle was dominated by the down-to-the-wire budget negotiations in Washington, ongoing unrest in the Middle East, the nuclear crisis in Japan, a major congressional debate on climate change regulations took place in the House (and Senate) that vividly demonstrated how far off the rails we've gone in public discourse of climate science and policy.

Let me state right off the bat that I tend to shy away from directly discussing politics in this column, instead sticking to scientific developments in the sprawling and fascinating field of climate research. At the same time, I recognize that climate science has become so politicized that it's impossible to steer clear of politics entirely. This is understandable considering that many of the potential solutions to climate change could involve major policy changes, from federal regulations of emissions from cars, trucks, and power plants to a carbon tax on gasoline.

The controversy surrounding the science is largely a front for concerns over potential regulation, as is vividly demonstrated in the book, "Merchants of Doubt", by Naomi Oreskes and Eric Conway.

With the passage on April 6 of a bill that would stop the U.S. EPA's regulations of greenhouse gases from moving forward, the House of Representatives signaled in crystal clear legislative language that it flat out does not believe that manmade climate change is a real phenomenon that poses risks to Americans' health and welfare.

I say this because, during the debate on the EPA measure (which failed in the Senate and was not attached to the 11th hour budget agreement), the House held a separate vote on an amendment which for the first time put all Members on record about whether they agree with the scientific evidence showing that the global climate is warming, and this warming is likely due in part to human activities. This vote was as close to a climate science litmus test as you're ever going to get.

Offered by three Democrats - Henry Waxman, Jay Inslee, and Diana DeGette - the amendment would have added language to the bill stating that Congress agrees with the EPA's findings on climate science.

The amendment stated: "Congress accepts the scientific findings of the Environmental Protection Agency that climate changes is occurring, is caused largely by human activities, and poses significant risks for public health and welfare."

The EPA's findings were in turn based on peer reviewed scientific research and the findings contained in reports from groups such as the U.N. Intergovernmental Panel on Climate Change

(IPCC), the U.S. government's Global Change Research Program, and the National Academy of Sciences.

From a scientific perspective, the amendment's language was rather benign. It was not a climate alarmist statement, nor did it overstep the science as expressed by highly-regarded research groups, not to mention the trove of peer reviewed scientific studies on climate change that seem to multiply by an order of magnitude each week.

The fact that it failed by a vote of 184 to 240 (three Democrats were among those who rejected the amendment; one Republican supported it) signals the depth of the problem that scientists, environmental policy advocates, environmentalists, and others face in pushing for climate change action at the federal level. A majority of one chamber of the Congress just does not agree with the conclusions of most publishing climate scientists. This is a remarkable turn of events, considering that the last Congress narrowly passed a sweeping greenhouse gas regulation bill, which died in the Senate.

Speaking on the House floor, Congressman Waxman said it best when he stated last week, "As long as Congress pretends that climate change isn't occurring, we can justify not addressing it."

Rep. DeGette also framed the issue well. "We in Congress can certainly change the laws of this country, but last I heard we cannot change the laws of nature."

Now before I portray all Republicans as a bunch of climate science know-nothings bent on destroying the planet, there are many reasons one might vote to halt the EPA's climate regulations and oppose the Waxman amendment, reasons that have nothing to do with the climate science.

Climate policy scholars have long argued over what the best way to reduce greenhouse gas emissions, and EPA regulations have typically been viewed as a last resort rather than a front line weapon because they are thought to be more cumbersome and potentially more costly as other regulatory tools. In fact, during the debate last week many Republicans argued that Congress, not the EPA, should address this issue.

However, that's not likely to happen if many Members don't recognize that the problem exists.

The House vote is particularly disturbing given that it comes at a time when climate scientists are issuing increasingly dire warnings of what's in store for a super-greenhouse future, and many other countries are making serious attempts at addressing the problem. For example, a recent study concludes that the temperature target countries agreed to during the Copenhagen Climate Summit in 2009 is no longer feasible because emissions are rising too quickly. And the American Medical Association just warned doctors that they have to plan for increasing public health impacts from climate change.

As someone who speaks with climate scientists every day to learn about their research, and who believes passionately in the importance of a healthy relationship between scientists and policy makers, it's simply embarrassing to see lawmakers act with such disregard for scientific evidence.

It also raises an unsettling question: where do we go from here?

## [EPA official calls Cornell gas-climate study 'important piece of information](#)

The Hill, 4/12/2011

By Ben Geman

A senior Environmental Protection Agency official said Tuesday that a controversial study about the global warming effects of some natural gas development warrants federal review, while expressing confidence that the emissions it describes can be brought under control.

"This study . . . is an important piece of information that we need to bring into the discussion," said Robert Perciasepe, EPA's deputy administrator, at a Senate Environment and Public Works Committee hearing on natural gas drilling.

Cornell University researchers, in a forthcoming paper, say that natural gas developed through the drilling method called "hydraulic fracturing" is more damaging to the climate than coal over 20 years, with comparable global warming effects over a century.

The study challenges the widely held view that gas is far more climate-friendly than coal. It argues that "fugitive" emissions of the potent greenhouse gas methane at well sites and gas distribution render this untrue.

Perciasepe said that technologies are available to curb the release of methane at development sites. "These are generally problems that can be addressed through proper controls or through collection controls at the wellhead," said Perciasepe, who noted the methane issue "needs to be taken into account."

Perciasepe emphasized the need to both reduce emissions of methane at shale gas drilling sites, and traditional pollutants that contribute to smog and other problems. "This is something that is going to have to be looked at over the long haul here. We have to make sure that fugitive emissions can be reduced," he said.

"If this study, after we review it, adds to this discussion, we are going to definitely want be looking as a country at reducing the emissions from these facilities," he said.

The study's authors have acknowledged that their data is limited, but say it's the best available, and that more attention is needed to the matter.

But multiple oil-and-gas industry groups have gone on the attack over the paper, alleging its methodology is shoddy.

Sen. Jeff Merkley (D-Ore.), at the hearing, called the study "a real surprise to many of us."

Perciasepe's prepared testimony Tuesday highlighted EPA efforts to tackle gas-sector methane emissions through a partnership with companies called the Natural Gas STAR program.

"Beginning in 1993, this successful voluntary program now has over 130 partner companies.

Together we have identified over 80 technologies and practices that can cost-effectively reduce methane emissions from the oil and natural gas sector,” he said.

### [Cornell Study: Shale Gas Has More GHG Emissions Than Coal and Oil](#)

The Energy Collective, 4/12/2011

By Nathanael Baker

A forthcoming study from Cornell University may dash the growing reputation natural gas has acquired as the “clean” burning fossil fuel.

According to research conducted by Robert Howarth, Renee Santoro, and Anthony Ingraffea, greenhouse gas emissions produced by natural gas derived from unconventional sources, primarily hydraulic fracturing, are significantly higher than that of conventional gas, coal, and oil.

Methane, a powerful greenhouse gas, is a significant component of natural gas. The authors estimate that between 30% and 200% more methane is emitted from shale gas produced from hydraulic fracturing, or fracking, wells. Hydraulic fracturing requires injecting pressurized water into rock formations to crack them open and harvest the gas encased within them. The majority of the methane escapes in the water as it flows back out, and then later, when the rock is further drilled open to extract the gas reserves.

Howarth and his team state the greenhouse gas footprint of shale gas is substantially greater than conventional gas and oil, and coal, especially when viewed over a 20-year time period. “Compared to coal, the footprint of shale gas is at least 20% greater and perhaps more than twice as great on the 20-year horizon and is comparable when compared over 100 years.”

With the United States sitting on the largest known reserve of shale gas, the energy source has quickly won a host of powerful supporters. Oil tycoon T. Boone Pickens has called natural gas the only energy source which can reduce emissions while supplying an answer to the country’s quest for energy independence.

Pickens has revamped his Pickens’ Plan – a blueprint to transition America from foreign fossil fuels to clean energy sources – so that it almost exclusively focuses on natural gas development. Currently he is pressing American lawmakers to pass the NAT GAS Act which would provide federal incentives for natural gas, while failing to fund other alternative fuels. Last week the NAT GAS Act was introduced in Congress.

Pickens states the President is supportive of this bill, and he may very well be right. President Obama has insisted it is time for America to eliminate its dependence on foreign oil. Although the President concedes it will take a myriad of energy sources to provide the nation with energy independence, natural gas appears to be the most tantalizing at the moment.

When he recently unveiled his own blueprint for energy independence the President placed particular emphasis on natural gas: “Recent innovations have given us the opportunity to tap large reserves – perhaps a century’s worth – in the shale under our feet. The potential here is enormous.”

The energy potential may be enormous, but likewise so are the environmental liabilities. The Cornell study, which will be published this month in the peer-reviewed journal *Climatic Change*, asserts that life-cycle emissions produced by hydraulic fracturing have not thoroughly been

examined. Even more, Congressmen as well as the Environmental Protection Agency (EPA) assert other environmental hazards such as dealing with the toxic flow-back water still need to be addressed. Multiple communities have reported drinking water contamination as a result of the toxic waste being injected into nearby water streams.

A recent New York Times investigative report show the politics around regulating hydraulic fracturing have existed since the Reagan administration. The EPA is currently conducting a study of the environmental impacts posed by fracking, but nevertheless, this latest study will likely add more fuel to the controversy surrounding one of the most popular new energy sources in the world.

### [Climate Conversations – What happens when 500 million Chinese switch on the light?](#)

Trust.org, 4/12/2011

By John Zysman and Erik Rasmussen

Exploding energy demand is hard to meet - even when you're not trying to do it cleanly.

China has urbanized 300 million people over the last 30 years, and its urban population is expected to increase by another 300 to 500 million by 2050. In developed countries, moving to the city tends to decrease individual energy footprints. But in developing countries, moving to the city means a shift in lifestyle and expectations, and with it an increase in energy used.

Therefore, China is throwing everything it can at the massive increase in energy demand, from dirty coal to dubious nuclear to green solar and wind.

Moreover, green energy remains, in most situations, more expensive than dirty coal. And even improvements that are clearly cost-effective in the long-term can be challenges for developing economies if they require up-front investments. Developing countries have no choice but to ask themselves whether they can afford green solutions.

However, developing countries are realizing that coal power and massive urbanization create serious problems. Local pollution and traffic congestion are becoming serious drags on the economy - even without accounting for the long-term effects of climate change.

Green solutions reduce pollution, and reduce the overall numbers of plants that must be built. That's a straightforward economic win. In addition, many renewable energy solutions fit a major challenge of China and India: the need to electrify large, widespread rural communities.

#### CRUCIAL TO SUCCESS

In a new study <<http://greengrowthleaders.org/>> , co-published by Green Growth Leaders and The Pathways Project at the University of California Berkeley, we have taken a hard look at the concept of green growth and the evidence behind it.

The classic understanding of green growth is the idea that economies can benefit from the new opportunities represented by new green technologies and products. For any economy, this means new industries and new jobs. But for developing countries, whose economic growth rates can average as high as 10 percent, successful development – and a livable future - requires the relentless pursuit of these types of new opportunities.

China's most recent Five Year Guideline identifies seven strategic emerging industries, of which three are energy-related: new energy, new energy vehicles, and energy efficiency and environmental protection.

The transition to green energy systems will also shake up existing industries, taking them in new directions based on new technologies. These kinds of shake-ups allow new entrants to establish leadership positions - such as Brazil in biofuels, or South Korea, which is pushing to become a dominant player in new smart grid technologies.

But green growth also means avoiding energy problems that could stall or reverse growth. Disruptions like oil shocks can represent speed bumps even for developed economies. But for fragile developing states they can present serious risks to state stability. Longer-term issues like particulate pollution can also be serious problems for countries that are already struggling to deal with the ordinary stresses of development.

Renewables and efficiency technologies offer energy security and, as a result, economic security. They smooth developing countries' growth paths. Capturing these kinds of gains from green growth requires not just manufacturing and exporting green technologies, but integrating them into a country's own energy grid - becoming a green growth market, not just a green growth supplier.

## LOOKING AHEAD

Developing countries are making choices right now that determine the growth path they're on. The direction of industrial development makes a huge difference. The fact that India has a different emissions profile than manufacturing-dominated China is partly because it has tended toward service industries rather than manufacturing-based economic growth.

Choices made now will also determine the features of the energy systems of the future. These features in turn dictate human behavior and the use of energy, and they can be very difficult to shift once they are entrenched in infrastructure and culture.

Consider the example of the United States, whose towns and cities have largely developed around a relatively high level of automobile usage. This pattern results in higher emissions and more pollution. But it is engrained in culture and in infrastructure - through under-investment in public transportation and an urban planning model that has led to low-density neighborhoods with low walkability.

Now is the time when developing countries can think about what behavior patterns they are setting up. China's use of cars, for instance, is currently skyrocketing. India is facing the choice of how to electrify rural communities. Brazil is looking for a growth model that doesn't involve destruction of its crucial forests, which act as carbon sinks.

Green growth for these developing countries means finding their own path that allows each country to achieve energy security and stability without compromising short-term growth, and without putting in place systems that will come back to haunt them in the longer term.

## SUPPORTING SMART DECISIONS

Developing countries will be making these decisions under time and money pressure: choices have

to be made now and they have to be accessible at a cost developing countries can afford in the short term. It is in developing countries' best interests to commit to pursuing green growth, but developed countries need to help make it possible for them to make the right choices.

But developing countries need to be aware that there's a feedback effect. Knowing that developing countries are on board is one necessary ingredient to winning support for widespread cooperative action like climate treaties. Developing countries can provide a major boost to potential export markets by committing to action - publicly and in concert with developed countries.

### **Rush to Use Crops as Fuel Raises Food Prices and Hunger Fears**

NY Times 4/6/2011

By Elisabeth Rosenthal

The starchy cassava root has long been an important ingredient in everything from tapioca pudding and ice cream to paper and animal feed.

But last year, 98 percent of cassava chips exported from Thailand, the world's largest cassava exporter, went to just one place and almost all for one purpose: to China to make biofuel. Driven by new demand, Thai exports of cassava chips have increased nearly fourfold since 2008, and the price of cassava has roughly doubled.

Each year, an ever larger portion of the world's crops — cassava and corn, sugar and palm oil — is being diverted for biofuels as developed countries pass laws mandating greater use of nonfossil fuels and as emerging powerhouses like China seek new sources of energy to keep their cars and industries running. Cassava is a relatively new entrant in the biofuel stream.

But with food prices

rising sharply in recent months, many experts are calling on countries to scale back their headlong rush into green fuel development, arguing that the combination of ambitious biofuel targets and mediocre harvests of some crucial crops is contributing to high prices, hunger and political instability.

This year, the United Nations Food and Agriculture Organization reported that its index of food prices was the highest in its more than 20 years of existence. Prices rose 15 percent from October to January alone, potentially "throwing an additional 44 million people in low- and middle-income countries into poverty," the World Bank said.

Soaring food prices have caused riots or contributed to political turmoil in a host of poor countries in recent months, including Algeria, Egypt and Bangladesh, where palm oil, a common biofuel ingredient, provides crucial nutrition to a desperately poor populace. During the second half of 2010, the price of corn rose steeply — 73 percent in the United States — an increase that the United Nations World Food Program attributed in part to the greater use of American corn for bioethanol.

"The fact that cassava is being used for biofuel in China, rapeseed is being used in Europe, and sugar cane elsewhere is definitely creating a shift in demand curves," said Timothy D. Searchinger, a research scholar at Princeton University who studies the topic. "Biofuels are contributing to higher prices and tighter markets."

In the United States, Congress has mandated that biofuel use must reach 36 billion gallons annually by 2022. The European Union stipulates that 10 percent of transportation fuel must come from renewable sources like biofuel or wind power by 2020. Countries like China, India, Indonesia and Thailand have adopted biofuel targets as well.

To be sure, many factors help drive up the price of food, including bad weather that ruins crop yields and high oil prices that make transportation costly. Last year, for example, unusually severe weather destroyed wheat harvests in Russia, Australia and China, and an infestation of the mealy bug reduced Thailand's cassava output.

Olivier Dubois, a bioenergy expert at the Food and Agriculture Organization in Rome, said it was hard to quantify the extent to which the diversions for biofuels had driven up food prices.

"The problem is complex, so it is hard to come up with sweeping statements like biofuels are good or bad," he said. "But what is certain is that biofuels are playing a role. Is it 20 or 30 or 40 percent? That depends on your modeling."

While no one is suggesting that countries abandon biofuels, Mr. Dubois and other food experts suggest that they should revise their policies so that rigid fuel mandates can be suspended when food stocks get low or prices become too high.

"The policy really has to be food first," said Hans Timmer, director of the Development Prospects Group of the World Bank. "The problems occur when you set targets for biofuels irrespective of the prices of other commodities."

Mr. Timmer said that the recent rise in oil prices was likely to increase the demand for biofuels.

It can be tricky predicting how new demand from the biofuel sector will affect the supply and price of food. Sometimes, as with corn or cassava, direct competition between purchasers drives up the prices of biofuel ingredients. In other instances, shortages and price inflation occur because farmers who formerly grew crops like vegetables for consumption plant different crops that can be used for fuel.

China learned this the hard way nearly a decade ago when it set out to make bioethanol from corn, only to discover that the plan caused alarming shortages and a rise in food prices. In 2007 the government banned the use of grains to make biofuel.

Chinese scientists then perfected the process of making fuel from cassava, a root that yielded good energy returns, leading to the opening of the first commercial cassava ethanol plant several years ago.

"They're moving very aggressively in this new direction; cassava seems to be the go-to crop," said Greg Harris, an analyst with Commodore Research and Consultancy in New York who has studied the trade.

In addition to expanding cassava cultivation at home, China is buying from Cambodia and Laos as well as Thailand.

Although a mainstay of diets in much of Africa, cassava is not central to Asian diets, even though the

Chinese once called it “the underground food store” because it provided crucial backup nutrition in lean harvest years. So the Chinese reasoned that making fuel with cassava would not directly affect food prices or create food shortages, at least at home. The proportion of Chinese cassava going to ethanol leapt to 52 percent last year from 10 percent in 2008.

More distant or indirect impacts are considered to be likely, however. Because cassava chips have been commonly used as animal feed, new demand from the biofuels industry might affect the availability and cost of meat. In Southeast Asian countries where China is paying generously for stockpiles of cassava, farmers may be tempted to grow the crop instead of, for example, other vegetables or rice.

And if China turned to Africa as a source, one of that continent’s staple food crops could be in jeopardy, although experts note that exporting cassava could also become a business opportunity.

“This is becoming a more valuable cash crop,” Mr. Harris said. “The farmland is limited, so the more that is devoted to fuel, the less is devoted to food.”

The Chinese demand for cassava could also dent planned biofuel production in poorer Asian nations: in the Philippines and Cambodia, developers were recently forced to suspend the construction of cassava bioethanol plants because the tuber had become too expensive.

Thailand’s own nascent biofuel industry may have trouble getting the homegrown cassava it needs because it may not be able to match the prices offered by Chinese buyers, according to the Food and Agriculture Organization.

Biofuels development in wealthier nations has already proved to have a powerful effect on the prices and the cultivation of crops. Encouraged by national biofuel subsidies, nearly 40 percent of the corn grown in the United States now goes to make fuel, with prices of corn on the Chicago Mercantile Exchange rising 73 percent from June to December 2010.

Such price rises also have distant ripple effects, food security experts say. “How much does the price of corn in Chicago influence the price of corn in Rwanda? It turns out there is a correlation,” said Marie Brill, senior policy analyst at ActionAid, an international development group. The price of corn in Rwanda rose 19 percent last year.

“For Americans it may mean a few extra cents for a box of cereal,” she said. “But that kind of increase puts corn out of the range of impoverished people.” Higher prices also mean that groups like the World Food Program can buy less food to feed the world’s hungry.

European biofuels developers are buying large tracts of what they call “marginal land” in Africa with the aim of cultivating biofuel crops, particularly the woody bush known as jatropha. Advocates say that promoting jatropha for biofuels production has little impact on food supplies. But some of that land is used by poor people for subsistence farming or for gathering food like wild nuts.

“We have to move away from the thinking that producing an energy crop doesn’t compete with food,” said Mr. Dubois of the Food and Agriculture Organization. “It almost inevitably does.”

## **50% Acknowledge Conflict Between Economic Growth and Environmental Protection, Highest Level Yet**

Rasmussen Reports, 4/5/2011

The Obama administration has dismissed rumors that BP was given the go ahead to resume drilling in the Gulf of Mexico. Meanwhile, the number of voters who believe protecting the environment gets in the way of a growing economy has reached its highest level in just over two years.

A new Rasmussen Reports national telephone survey finds that 50% of Likely Voters say there's a conflict between economic growth and environmental protection. That's up seven-points from earlier this year and is the highest level measured since January 2009. In the latest survey, 30% do not believe there's a conflict between those two areas, while another 20% are not sure.

Fifty-seven percent (57%) now say investing in renewable energy sources like solar and wind are the best long-term investment for America. But that's down nine points from January when 66% of voters felt that way. Thirty-one percent (31%) say investing in fossil fuels like coal, gas and oil is the way to go. Twelve percent (12%) are undecided. (To see survey question wording, [click here](#).)

But separate polling finds that one-in-two Americans are ready to drill for oil in the Arctic National Wildlife Refuge (ANWR) to lessen the country's dependence on foreign oil.

A solid majority (60%) say finding new sources of energy is more important than reducing the amount of energy Americans now consume. Thirty-one percent (31%) feel the opposite is true. These findings have remained fairly consistent since January 2009.

(Want a free daily e-mail update? If it's in the news, it's in our polls). Rasmussen Reports updates are also available on Twitter or Facebook.

The survey of 1,000 Likely Voters was conducted on April 3-4, 2011 by Rasmussen Reports. The margin of sampling error is +/- 3 percentage points with a 95% level of confidence. Field work for all Rasmussen Reports surveys is conducted by Pulse Opinion Research, LLC. See methodology.

A plurality of voters (43%) rates Obama's handling of energy issues as poor, a finding that has ranged from a low of 18% to a high of 46% since he was elected president in November 2008. One-in-three voters (33%) gives the president good or excellent marks on energy issues.

When it comes to global warming, 47% of voters say climate change is primarily caused by long-term planetary trends. Thirty-six percent (36%) disagree and believe human activity is more to blame. Ten percent (10%) are undecided. While more voters have blamed planetary trends since January 2009, this is the widest gap between the two since July of last year.

Voters still do not believe President Obama's views on global warming are in line with their own, though. Fifty-one percent (51%) say Obama thinks global warming is caused by human activity, while just 17% say he believes long-term planetary trends are the chief cause of climate change. Twenty-four percent (24%) are not sure. These findings have showed little change since a month after he assumed office.

Separate polling finds that a plurality of voters (46%) recognizes that the view Obama holds on global warming is held primarily by liberals.

Still, 62% say global warming is at least a somewhat serious problem, including 34% who think it's a Very Serious issue. Thirty-six percent (36%) do not believe climate change is a serious problem.

Gas prices have been rising dramatically in the past couple months, and opposition to President Obama's continuing ban on oil drilling off the Eastern seaboard and in the eastern portion of the Gulf of Mexico is up from early December when the policy was first announced.

President Obama's agenda includes an emphasis on education and utilizing clean energy, but most voters don't know the Cabinet members the president is depending on to lead policy in these areas.

As the Japanese continue to struggle with the damaged Fukushima nuclear facility, support for the building of nuclear plants in the United States has fallen to a new low. One-third of voters now favor phasing out nuclear power in this country.

Additional information from this survey and a full demographic breakdown are available to Platinum Members only.

### **[Critics' review unexpectedly supports scientific consensus on global warming](#)**

A UC Berkeley team's preliminary findings in a review of temperature data confirm global warming studies.

Los Angeles Times, 4/4/2011

By Margot Roosevelt,

A team of UC Berkeley physicists and statisticians that set out to challenge the scientific consensus on global warming is finding that its data-crunching effort is producing results nearly identical to those underlying the prevailing view.

The Berkeley Earth Surface Temperature project was launched by physics professor Richard Muller, a longtime critic of government-led climate studies, to address what he called "the legitimate concerns" of skeptics who believe that global warming is exaggerated.

But Muller unexpectedly told a congressional hearing last week that the work of the three principal groups that have analyzed the temperature trends underlying climate science is "excellent.... We see a global warming trend that is very similar to that previously reported by the other groups."

The hearing was called by GOP leaders of the House Science & Technology committee, who have expressed doubts about the integrity of climate science. It was one of several inquiries in recent weeks as the Environmental Protection Agency's efforts to curb planet-heating from industrial plants and motor vehicles have come under strenuous attack in Congress.

Muller said his group was surprised by its findings, but he cautioned that the initial assessment is based on only 2% of the 1.6 billion measurements that will eventually be examined.

The Berkeley project's biggest private backer, at \$150,000, is the Charles G. Koch Charitable Foundation. Oil billionaires Charles and David Koch are the nation's most prominent funders of

efforts to prevent curbs on the burning of fossil fuels, the largest contributor to planet-warming greenhouse gases.

The \$620,000 project is also partly funded by the federal Lawrence Berkeley National Laboratory, where Muller is a senior scientist. Muller said the Koch foundation and other contributors will have no influence over the results, which he plans to submit to peer-reviewed scientific journals.

Ken Caldeira, an atmospheric scientist at the Carnegie Institution for Science, which contributed some funding to the Berkeley effort, said Muller's statement to Congress was "honorable" in recognizing that "previous temperature reconstructions basically got it right.... Willingness to revise views in the face of empirical data is the hallmark of the good scientific process."

But conservative critics who had expected Muller's group to demonstrate a bias among climate scientists reacted with disappointment.

Anthony Watts, a former TV weatherman who runs the skeptic blog *WattsUpWithThat.com*, wrote that the Berkeley group is releasing results that are not "fully working and debugged yet.... But, post normal science political theater is like that."

Over the years, Muller has praised Watts' efforts to show that weather station data in official studies are untrustworthy because of the urban heat island effect, which boosts temperature readings in areas that have been encroached on by cities and suburbs.

But leading climatologists said the previous studies accounted for the effect, and the Berkeley analysis is confirming that, Muller acknowledged. "Did such poor station quality exaggerate the estimates of global warming?" he asked in his written testimony. "We've studied this issue, and our preliminary answer is no."

Temperature data are gathered from tens of thousands of weather stations around the globe, many of which have incomplete records. Over the last two decades, three independent groups have used different combinations of stations and varying statistical methods and yet arrived at nearly identical conclusions: The planet's surface, on average, has warmed about 0.75 degrees centigrade (1.4 degrees Fahrenheit) since the beginning of the 20th century.

Temperature data were the focus of the so-called 2009 Climategate controversy, in which opponents of greenhouse gas regulation alleged that leaked emails from a British climate laboratory showed manipulation of weather station records. Five U.S. and British government and university investigations have refuted the charges.

"For those who wish to discredit the science, this [temperature] record is the holy grail," said Peter Thorne, a leading expert at the National Oceanic and Atmospheric Administration's National Climatic Data Center in Asheville, N.C. "They figure if they can discredit this, then society would have significant doubts about all of climate science."

Thorne said scientists who contributed to the three main studies — by NOAA, NASA and Britain's Met Office— welcome new peer-reviewed research. But he said the Berkeley team had been "seriously compromised" by publicizing its work before publishing any vetted papers.

On the project's website, in a public lecture and in statements to the media, < Muller had portrayed the Berkeley effort as rectifying the "biases" of previous studies, a task he compared with "Hercules

cleaning out the Augean stables." He said his study would be "more precise," analyzing data from 39,000 stations — more than any other study — and offering "transparent," rather than "homogenized" data.

Kevin Trenberth, who heads the Climate Analysis Section of the National Center for Atmospheric Research, a university consortium, said he was "highly skeptical of the hype and claims" surrounding the Berkeley effort. "The team has some good people," he said, "but not the expertise required in certain areas, and purely statistical approaches are naive."

The project team includes UC Berkeley statistician David Brillinger and UC Berkeley physicists Don Groom, Robert Jacobsen, Saul Perlmutter, Arthur Rosenfeld and Jonathan Wurtele. The group's atmospheric scientist is Judith Curry, chairwoman of the School of Earth and Atmospheric Science at Georgia Tech, who has suggested that temperature data were "airbrushed" by other scientists.

One full-time staffer, Richard Rohde, a who recently earned a doctorate in statistics, is doing most of the work, Muller said.

Although in his testimony Muller praised the "integrity" of previous studies, he said estimates of human-caused warming need to be "improved." And despite his preliminary praise for earlier studies, he said further data-crunching "could bring our current agreement into disagreement."

Other scientists noted that temperature is only one factor in climate change. "Even if the thermometer had never been invented, the evidence is there from deep ocean changes, from receding glaciers, from rising sea levels and receding sea ice and spring snow cover," Thorne said.

"All the physical indicators are consistent with a warming world. There is no doubt the trend of temperature is upwards since the early 20th century. And that trend is accelerating."

### [Obama's disappointing energy plan](#)

Washington Post, 3/30/2011

By Ezra Klein

Pop quiz: What do turmoil in the Middle East, an earthquake in Japan and the summer all have in common? The answer is they all raise the cost of, and public anxiety about, energy. And so the White House, right on schedule, is offering a new plan to protect "America's Energy Security." Unfortunately, it's not a very good plan, even if it may be very good politics. It says less about how we'll solve our energy problems than how we've resigned ourselves to not solving them.

Energy security is shorthand for "oil we drill here" as opposed to "oil that gets shipped here." So the first part of the plan is all about expanding domestic production of some of the very fuel we need to be weaning ourselves off of. The truth is that the Obama administration's energy policy looks more like Sarah Palin's applause lines than the cap-and-trade program it advocated during the election. That's not because the White House wouldn't prefer the plan it pushed in 2008 to the plan it's pushing in 2011. Congress, not the administration, opposes to cap-and-trade. But we are where we are, and there's no use dressing it up. You can put lipstick on "drill, baby, drill," but it's still "drill, baby, drill."

The section on renewables is somewhat more encouraging: Fuel standards for commercial trucks. More home weatherization. Doubling funding for innovation through the successful ARPA-E, or Advanced Research Projects Agency-Energy, program. But it's a much safer bet that Congress will pass legislation authorizing more drilling than doubling ARPA-E's budget. We might end up with the worst parts of this proposal passed into law and the best parts left on the White House's Web site.

Perhaps the most striking portion of the plan is "an ambitious but achievable goal of generating 80 percent of the Nation's electricity from clean energy sources by 2035." That target is what's known in energy circles as a "clean energy standard," and it doesn't always command a lot of respect. Robert Stavins, an environmental economist at Harvard, has addressed this idea before and said it "would accomplish considerably less and would impose much higher costs per ton of emissions reduction than cap-and-trade would." He also worries that it might make bolder action less likely in the future: "there is a real danger that enacting these standards will create the illusion that we have done something serious to address climate change [and] create a favored set of businesses that will oppose future adoption of more efficient, serious, broad-based policies."

But if the policy is depressing, the plan probably gets the politics just right. Cap-and-trade has no chance in Congress. Americans aren't very worried about global warming. Gas prices are soon to rise. Obama needs to look presidential and solutions-oriented while Congress squabbles over the budget for the rest of 2011. On all those measures, this plan will very likely be successful. It just won't do much for the planet.