

CLIMATE CHANGE HARMFUL TO IOWA FARMERS & ECONOMY

FOR IOWA'S FARMERS, CLIMATE CHANGE BRINGS RISING TEMPERATURES, INCREASED AND MORE FREQUENT PRECIPITATION, AND FLOODING

RATE OF CARBON POLLUTION IN IOWA AMONG THE HIGHEST IN U.S.; AVG. MIDWEST TEMPERATURES HAVE INCREASED, AND WILL CONTINUE RISING

Among Carbon Pollution's Effects On The Planet Are Warmer Temperatures, Extreme Precipitation, And Rising Sea Levels. According to the EPA, "Greenhouse gas concentrations in the atmosphere will continue to increase unless the billions of tons of our annual emissions decrease substantially. Increased concentrations are expected to increase Earth's average temperature; influence the patterns and amounts of precipitation; reduce ice and snow cover, as well as permafrost; raise sea level; [and] increase the acidity of the oceans." [EPA, [Future Climate Change](#)]

Iowa Ranks 11th Nationally In Carbon Pollution Per Capita; One Of Just Two States To See An Increase Since 2000. Between 2000 and 2011, Iowa ranked 11th among all 50 states and the District of Columbia in per-capita energy-related carbon pollution. In 2000, Iowa released 26.3 metric tons of carbon pollution per person; in 2011, the state released 27.3 metric tons of carbon pollution per person. Iowa is one of just two states in the country (Nebraska the other) to increase the amount of carbon pollution per capita during this [EIA, [August 2014](#), pg. 3, 10]

National Climate Assessment: "Rate Of Warming In The Midwest Has Markedly Accelerated Over The Past Few Decades ... Trends Are Consistent With Expectations Of Increased Concentrations Of Heat-Trapping Gases." According to the 2014 National Climate Assessment, "The rate of warming in the Midwest has markedly accelerated over the past few decades. Between 1900 and 2010, the average Midwest air temperature increased by more than 1.5°F. However, between 1950 and 2010, the average temperature increased twice as quickly, and between 1980 and 2010, it increased three times as quickly as it did from 1900 to 2010 ... These trends are consistent with expectations of increased concentrations of heat-trapping gases and observed changes in concentrations of certain particles in the atmosphere." The National Climate Assessment includes the following states in the Midwest: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. [U.S. National Climate Assessment 2014, [Midwest](#)]

CLIMATE CHANGE CAUSES INCREASINGLY SEVERE PRECIPITATION DURING SPRING – EVEN FLOODING – FOLLOWED BY DRY SUMMERS

1980 – 2014: Iowa Had 39 Extreme Weather Events That Each Caused More Than \$1 Billion In Damages. Between 1980 and 2014, Iowa suffered 39 "weather and climate events ... that have resulted in more than \$1 billion in damages." [National Climatic Data Center, [1980-2014](#)]

Climate Change Leads To Increased Instances Of "Extreme Precipitation Events"; Wetter Springs And Drier Summers. According to the 2014 National Climate Assessment, "There is compelling evidence that annual total precipitation has been increasing in the [Midwest] region, with wetter winters and springs, drier summers, and an increase in extreme precipitation events, and changes in snowfall patterns. These observations are consistent with climate model projections. Both the observed trends and climate models suggest these trends will increase in the future." [U.S. Global Change Research Program, [2014 National Climate Assessment](#)]

Increasing Frequency Of Flooding In Upper Midwest, Including Iowa, "Consistent With Current Thinking Among Climate Scientists" About Global Warming Link To Precipitation And Flooding. A February 2015 study – published in the British journal *Nature Climate Change* – found that "the frequency – but not the intensity – of floods in the Upper Midwest has been increasing in recent decades ... 'It's not that big floods are getting bigger, but that we have been

experiencing a larger number of big floods,' says Gabriele Villarini, University of Iowa assistant professor of civil and environmental engineering and an author of the paper ... Floods cause billions of dollars of economic losses, loss of life and other human misery ... The researchers based their findings on daily records collected by the U.S. Geological Survey at hundreds of stream gauges from 1962-2011. They found that 34 percent of the stations had an increase in frequency in the number of flood events, while only 9 percent showed a decrease ... Researchers did not attempt to link the findings to climate change, nor did they make any future projections about how climate change might affect floods. But a University of Iowa press release about the research said the findings are consistent with current thinking among climate scientists about how the hydrological cycle is being affected by global warming." The states included in the study were Iowa, Illinois, Indiana, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, West Virginia, and Wisconsin. [USA Today, [2/11/15](#)]

Since 1993, Record Floods In Iowa Resulted In More Than \$3 Billion In Taxpayer Funds To Recover And Rebuild Cities With Better Flood Protection Measures. According to the 2014 National Climate Assessment, "Cedar Rapids, Des Moines, Iowa City, and Ames, Iowa, have all suffered multi-million-dollar losses from floods since 1993. In June 2008, a record flood event exceeded the once-in-500-year flood level by more than 5 feet, causing \$5 to \$6 billion in damages from flooding, or more than \$40,000 per resident of the city of Cedar Rapids. The flood inundated much of the downtown, damaging more than 4,000 structures, including 80% of government offices, and displacing 25,000 people. The record flood at Cedar Rapids was the result of low reservoir capacity and extreme rainfall on soil already saturated from unusually wet conditions. Rainfall amounts comparable to those in 1993 (8 inches over two weeks) overwhelmed a flood control system designed largely for a once-in-100-year flood event. Such events are consistent with observations and projections of wetter springs and more intense precipitation events ... With the help of more than \$3 billion in funding from the federal and state government, Cedar Rapids is recovering and has taken significant steps to reduce future flood damage, with buyouts of more than 1,000 properties, and numerous buildings adapted with flood protection measures." [U.S. National Climate Change Assessment 2014, [Midwest](#)]

Water Safety & Infrastructure Mechanisms Would Be Less Useful Because They Are "Based Upon Historical Patterns Of Precipitation." According to the 2014 National Climate Assessment, "Water infrastructure for flood control, navigation, and other purposes is susceptible to climate change impacts and other forces because the designs are based upon historical patterns of precipitation and streamflow, which are no longer appropriate guides." Iowa is bordered by parallel rivers – the Missouri River on the west, and the Mississippi River on the East; both rivers have significant flood control infrastructure that may now be inadequate. [U.S. National Climate Change Assessment 2014, [Midwest](#)]

AGRICULTURE IS ONE-THIRD OF IOWA'S ECONOMY; CLIMATE CHANGE THREATENS CROPS WITH FLOODS AND DROUGHTS

Iowa's Agriculture Industry Responsible For One Of Three Dollars In State's Economy; The State's Nearly 90,000 Farms – Almost All Of Which Are Family-Owned – Support More Than 400,000 Jobs. According to the Coalition to Support Iowa's Farmers, "Agriculture and ag-related businesses are responsible for 1 out of every 3 dollars that enter the Iowa economy. In 2012, more than 33 percent (\$112.1 billion) of Iowa's total economic output came from agriculture, up from \$72.1 billion (27 percent) in 2007 ... Iowa is home to 88,637 farms, 97.5 percent of which are family owned. Iowa agriculture supported 418,777 jobs in 2012, up from 332,000 in 2007. In fact, 21 percent of total jobs and 17 percent of total household income earned in the state of Iowa comes from agriculture and ag-related industries." [Coalition to Support Iowa's Farmers, [2014](#)]

The Expected "Large Increase In The Number Of Days With Heavy Rainfall" Means Delayed Planting, Reduced Crop Productivity, Unexpected Costs For Farmers, And Soil Erosion. According to the 2014 National Climate Assessment, "an analysis of the rainfall patterns across Iowa has shown there has not been an increase in total annual precipitation; however, there has been a large increase in the number of days with heavy rainfall. The increase in spring precipitation is evidenced by a decrease of three days in the number of workable days in the April to May period during 2001 through 2011 in Iowa compared to the period 1980-2000. To offset this increased precipitation, producers have been installing

subsurface drainage to remove more water from the fields at a cost of \$500 per acre ... Iowa is the nation's top corn and soybean producing state. These crops are planted in the spring. Heavy rain can delay planting and create problems in obtaining a good stand of plants, both of which can reduce crop productivity. In Iowa soils with even modest slopes, rainfall of more than 1.25 inches in a single day leads to runoff that causes soil erosion and loss of nutrients and, under some circumstances, can lead to flooding." Data shows that the number of days with more than 1.25 inches of rain is expected to steadily rise through the 21st century. [U.S. National Climate Change Assessment, 2014, [Agriculture](#)]

\$10 Billion Iowa Corn Industry – Could See Crop Yield Declines Of Up To 77 Percent. Risky Business, a research project chaired by Michael Bloomberg, Henry Paulson, and Tom Steyer, "focuses on quantifying and publicizing the economic risks from the impacts of a changing climate." A January 2015 Risky Business report stated, "Iowa has by far the highest percent of its state economy dependent on commodity agriculture of any of the states in this region; as a result, the economic output losses from commodity crop declines in Iowa are high (likely \$850 million to \$12 billion per year by century's end) even though yield declines aren't as high in this state as in some others ... The agricultural insurance industry in particular must pay close attention to increasing heat throughout the [Midwest] region, especially in Iowa, which we found will face the highest likely losses of any Midwest state from climate-related commodity crop yield declines. By the end of this century, absent significant adaptation by Iowa farmers, the state could face likely declines in its signature corn crop of 18% to 77%—a huge hit for a corn industry worth nearly \$10 billion." [Risky Business Report, [January 2015](#), pg. 18, 33; Risky Business, [About](#)]

For Iowa, "Summer Will Bring Likely Decreases In Precipitation"; "Higher Number Of Days" Without Precipitation "Could Lead To Agricultural Droughts." A January 2015 Risky Business report determined that, "If we stay on our current path, average annual precipitation across the Midwest will likely increase over the course of the century, compared to the past three decades. But looking only at annual averages across the region can mask differences in seasonal or local precipitation patterns, which directly affect rain- or snow-dependent industries such as agriculture and tourism. Precipitation increases are most probable in the spring, when most Midwestern states will very likely get wetter. In fall and winter, precipitation levels will also likely increase across the region, while summer will bring likely decreases in precipitation to Iowa and Wisconsin and mixed impacts to other states ... A higher average number of days without rainfall or snow ... could lead to agricultural droughts, reduced yields, and other economic impacts on key sectors in the future." [Risky Business Report, [January 2015](#), pg. 12, 44; Risky Business, [About](#)]

CLEAN POWER PLAN AND WIND-GENERATED ELECTRICITY ARE KEYS TO IOWA'S ALREADY BOOMING CLEAN ENERGY ECONOMY

CLEAN ENERGY SECTOR SUPPORTS NEARLY 23,000 IOWA JOBS; IT WILL GROW JOBS THREE TIMES FASTER THAN IOWA ECONOMY AS A WHOLE

Nearly 23,000 Iowans Work In The Advanced Energy Industry, At More Than 1,400 Businesses; Clean Energy Jobs Are Expected To Grow Three Times As Fast As Overall Employment In Iowa. According to the Advanced Energy Economy Institute, "Iowa has a significant advanced energy industry, employing 22,643 workers at 1,427 business establishments in 2014. This is more than the employment reported for crop production (21,734), general freight trucking (19,590) and animal production (19,170) in 2014. Advanced energy employment represents approximately 1.3% of Iowa's total workforce ... The projected 6% overall growth will drive the total advanced energy workforce to 23,979 by the summer of 2015. By comparison, overall employment growth in Iowa is expected to be in the neighborhood of 2%." [Advanced Energy Economy Institute, [December 2014](#)]

CLEAN POWER PLAN ALLOWS IOWA TO CRAFT ITS OWN CARBON POLLUTION REDUCTION PLAN; COULD CREATE 2,500 JOBS AND SAVE IOWANS \$235 MILLION ON ELECTRICITY BILLS BY 2020

Clean Power Plan Will Reduce Carbon Pollution From Power Plants, Creating Jobs In The U.S. And Making Homes And Businesses More Energy Efficient; Flexible Proposal Allows States To Implement A Plan That Best Fits Its Needs.

According to a June 2014 EPA fact sheet, “The U.S. Environmental Protection Agency, under President Obama’s Climate Action Plan, proposed a commonsense plan to cut carbon pollution from power plants ... Power plants are the largest source of carbon pollution in the U.S., accounting for roughly one-third of all domestic greenhouse gas emissions. The proposal will also cut pollution that leads to soot and smog by over 25 percent in 2030 ... The agency’s proposal is flexible—reflecting the different needs of different states. The proposal will put Americans to work making the U.S. electricity system less polluting and our homes and businesses more efficient, shrinking electricity bills by roughly 8 percent in 2030. It will keep the United States—and more importantly our businesses—at the forefront of a global movement to produce and consume energy in a better, more sustainable way.” [EPA Fact Sheet, [6/2/14](#)]

Under The Clean Power Plan, Iowa Could See 2,500 New Jobs While Saving \$235 Million On Electricity Bills In 2020.

According to a March 2015 Natural Resources Defense Council fact sheet, “Iowa is being asked to reduce its pollution intensity 16 percent by 2030 ... If Iowa ramps up energy efficiency and renewable power to the higher but still relatively modest levels NRDC analyzed, Iowa would see the creation of 2,500 new jobs, and the state’s households and businesses would save \$235 million on their electric bills in 2020. Because of the benefits to consumer electric bills and to the state’s job growth, NRDC recommended that EPA require more pollution reductions nationally than are currently in the Clean Power Plan proposal.” [NRDC, [March 2015](#)]

IOWA IS THE NATIONAL LEADER IN WIND ELECTRICITY; SECTOR SUPPORTS 7,000 JOBS IN STATE, AND OFFSETS CARBON OF 1.3 MILLION CARS ANNUALLY

In 2014, Wind Energy Supported Up To 7,000 Iowa Jobs; Iowa Landowners Earned More Than \$17 Million In Lease Payments For Wind Turbines. According to the American Wind Energy Association, “An investment in wind power is an investment in jobs, including jobs in operations and maintenance, construction, manufacturing and many support sectors. In addition, wind projects produce lease payments for landowners and increase the tax base of communities. 2014 direct and indirect jobs supported: 6,001 to 7,000; total capital investment: \$10.0 billion; annual land lease payments: \$17.1 million.” [American Wind Energy Association, Iowa Fact Sheet, [March 2015](#)]

Iowa Leads U.S. In Wind Electricity – Nearly 30 Percent. According to the American Wind Energy Association, “In 2014, Iowa generated more than 28% of its electricity from wind power - first in the nation. Iowa possesses a very strong wind resource, the third most installed wind capacity of any state, and is a leader in wind manufacturing.” That is the equivalent of 1.5 million homes powered by wind. [American Wind Energy Association, Iowa Fact Sheet, [March 2015](#)]

Iowa Wind Electricity Annually Cuts Carbon Pollution by 6 Million Metric Tons, Equivalent to Removal of 1.3 Million Cars From Road. According to the American Wind Energy Association, “Generating wind power creates no emissions and uses virtually no water. Annual state water consumption savings: 3.5 billion gallons; equivalent number of water bottles saved: 26.5 billion; annual state carbon dioxide (CO2) emissions avoided: 5.9 million metric tons; equivalent number of cars taken off the road: 1.3 million.” [American Wind Energy Association, Iowa Fact Sheet, [March 2015](#)]

Production Tax Credit (PTC) Provides Financial Incentives To Develop Of Renewable Energy, Including Wind Energy; Since 2007, U.S. Wind Capacity Has Nearly Quadrupled, With Costs Falling By More Than 40 Percent. According to the Union of Concerned Scientists, “the Production Tax Credit (PTC) is a federal incentive that provides financial support for the development of renewable energy facilities. Companies that generate electricity from wind ... are eligible for a federal PTC, which provides a 2.3-cent per kilowatt-hour (kWh) incentive for the first ten years of a renewable energy facility's operation ... According to the U.S. Department of Energy: between 2007 and 2014, U.S. wind capacity has nearly quadrupled, representing an annual average investment of nearly \$15 billion; more than 550 manufacturing facilities located in 43 states produce 70 percent of the wind turbines and components installed in the United States, up from 20 percent in 2006 – 2007; [and] the cost of generating electricity from wind has fallen by more than 40 percent over the past three years.” [Union of Concerned Scientists, PTC for Renewable Energy, [2015](#)]