

# FACTS NEBRASKA

A M E R I C A N S E C U R I T Y P R O J E C T

## Pay Now, Pay Later: Nebraska

Nebraska's \$15.3 billion agricultural industry<sup>1</sup> relies heavily on irrigation, which is already stretched to the limit.

Corn and soybean crop yields could decline by as much as 17% for every degree Celsius increase in temperature during the growing season,<sup>2</sup> harming sectors currently worth over \$7 billion.<sup>3</sup>

Jobs in the clean energy economy more than doubled from 1998-2007;<sup>4</sup> analysts estimate that comprehensive clean energy and climate legislation could create as many as 38,000 jobs in Nebraska by 2020.<sup>5</sup>

According to a new study, a failure to mitigate the effects of climate change could begin to cause serious gross domestic product and job losses within the next several decades. Between 2010 and 2050, it could cost Nebraskans \$1.4 billion in GDP and over 4,000 jobs.\*

*\*GDP numbers are based on a 0% discount rate. Job losses are measured in labor years, or entire years of fulltime employment. Backus, George et al., "Assessing the Near-Term Risk of Climate Uncertainty: Interdependencies among the U.S. States," Sandia Report (Sandia National Laboratories, May 2010), 141. [https://cfwebprod.sandia.gov/cfdocs/CCIM/docs/Climate\\_Risk\\_Assessment.pdf](https://cfwebprod.sandia.gov/cfdocs/CCIM/docs/Climate_Risk_Assessment.pdf) (accessed March 23, 2011).*

Admittedly, the effects of climate change, a complex and intricate phenomenon, are difficult to predict with precision. Informed scientific and economic projections, as we have used in our research, however, allow us to see that, Nebraska faces significant losses in industries crucial to its economy if no action is taken.

Moreover, data shows Nebraska is poised to benefit from the research, development, and distribution of renewable energy technologies. It is ranked 5<sup>th</sup> in the country for wind power potential,<sup>6</sup> and in 2008 generated enough wind energy to power nearly 17,000 homes.<sup>7</sup> The state's full wind potential could power approximately 70 million homes.<sup>8</sup> Should we fail to take action against climate change, Nebraskans have much to lose.

## Pay Later: The Effects of Global Warming

**Rising temperatures will stress water supplies needed by Nebraska's farms, which are already the most heavily irrigated in the country.**

Temperatures in Nebraska are expected to rise by 2-4°F by 2020 and 6-10°F by 2080-2099,<sup>9</sup> resulting in heat waves, droughts, and heavy rainfall,<sup>10</sup> as well as reduced water flows from the Rocky Mountain snowmelt. In addition, drier summers will threaten crops and increase the demand for irrigation; Nebraska is home to the largest area of irrigated land in the country.<sup>11</sup> Water is currently being pumped from the High Plains, or the Ogallala Aquifer as it is also known, faster than it can recharge; it is essential for irrigation and water supplies in Nebraska,

providing drinking water to 80% of the Great Plains population.<sup>12</sup>

## Threats to Agriculture and Omaha Steaks

In 2007, Nebraska produced 5.4% of the total value of U.S. agricultural products. Nebraska's primary agricultural commodities are cattle (40.8% of state agriculture value, \$6.2 billion in 2009), followed by corn (\$4.9 billion) and soybeans (\$2.3 billion).<sup>13</sup> Unfortunately, hotter temperatures are expected to trigger a decline in dairy output and increase the time-to-slaughter weight for beef cattle and swine; **Nebraska could lose as much as \$17 million annually from reduced beef production by 2040.**<sup>14</sup>

Nebraska is poised to benefit from the research, development, and distribution of renewable energy technologies. It is ranked 5<sup>th</sup> in the country for wind power potential, and in 2008 generated enough wind energy to power nearly 17,000 homes. The state's full wind potential could power approximately 70 million homes.

Warmer temperatures could cost the region as much as \$12.4 million in

losses to the swine industry each year beginning in 2040.<sup>15</sup> It was not long ago that a 1999 heat wave caused 3,000 cattle deaths and a loss of \$20 million. A temperature spike in 2009 killed more than 2,000 cattle. Yet, installing air conditioning in barns to combat the heat may prove prohibitively expensive.<sup>16</sup>

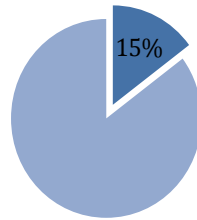
Corn and soybean yields could experience a 30-46% decline by the end of the century under a low emissions scenario, or 63-82% under a high emissions scenario.<sup>17</sup> In addition to the damage to crops from increasing temperatures and water shortages, increases in pests and weeds are also expected to damage crops and necessitate the use of more pesticides and herbicides, which become less effective the higher the carbon level. Americans currently spend over \$11 billion on weed control.<sup>18</sup> **Deforestation and water shortages will negatively affect hunting, fishing, and wildlife viewing—which brought in \$514 million in 2006, and created roughly 11,809 jobs.**<sup>19</sup>

Like livestock, wild animals are sensitive to rising temperatures and associated effects, and would either decline in numbers or seek cooler climates further north, disrupting an age old Nebraskan pastime.<sup>20</sup> Climate change could also contribute to a 20-50% decline in Nebraska's forested area, particularly in the eastern part of the state, where it would likely be replaced with grasslands<sup>21</sup>—which would also threaten Nebraska's \$286 million wood products manufacturing industry.<sup>22</sup>

## Effects on Health

**Nebraskans' health will be at risk from heat-related deaths and an increase in insect-borne diseases.**

## Nebraskan Labor Force Projected to be Directly Affected

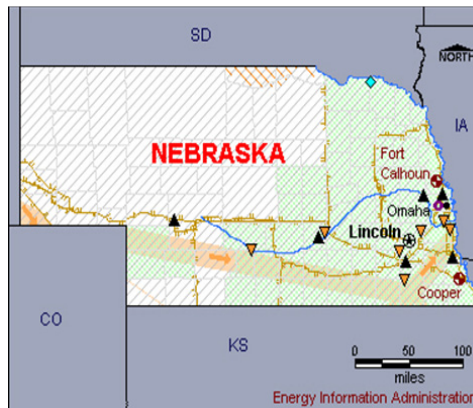


Source: U.S. Census Bureau<sup>23</sup>

**Analysts also predict that warmer temperatures may cause a rise in incidence of the West Nile virus and increase the lifespan of mosquitoes carrying malaria and ticks carrying Lyme disease.**<sup>24</sup>

## Pay Now: The Benefits of Taking Action

**Between 1998-2007, total jobs in Nebraska declined by nearly 5%, but jobs in the clean energy**



Legend	Major Electric Power Plants (>=100 MW)	Renewable Energy Potential
■ Coal Mine, Surface	▲ Coal	■ Biomass (>= 50 tons/sq km/yr)
■ Coal Mine, Underground	○ Geothermal	■ Geothermal (>= 80 milliwatts/m <sup>2</sup> )
★ Natural Gas Hub	◇ Hydroelectric	■ Solar (>= 6.0 kWh/m <sup>2</sup> /day)
■ Petroleum Refinery	▼ Natural Gas	■ Wind (>= 3 Power Class)
◆ Oil Import Site	● Nuclear	
■ Oil Seaport	● Petroleum	
■ Electricity Transmission Line (>= 345 kV)	● Wood	
■ Natural Gas Flow (1 mile band width = 100 million cubic feet/day)	● Other Renewable	
■ Oil and Gas Active Leases		

**economy more than doubled, reaching over 5,200, with an average annual growth of 10%.**<sup>25</sup> Analysts estimate that comprehensive national clean energy and climate legislation could create as many as 38,000 jobs in Nebraska by 2020<sup>26</sup>—and increase the gross state product (GSP) by 0.6-2.7% above baseline growth, by one estimate, adding up to \$4,120 to household income by this time as well.<sup>27</sup>

**Exploiting Nebraska's wind power potential could create tens of thousands of new jobs<sup>28</sup> and generate an estimated \$140-\$260 million annually between 2011 and 2030 from construction-related activities and \$250-\$442 million per year from operation activities.**<sup>29</sup> The state's open skies and more than 47,000 farms have the potential to create an additional 7,800 MW by 2030 using wind power.<sup>30</sup> Wind and biomass (such as switchgrass) have greater economic potential in Nebraska than solar power,<sup>31</sup> but given its resources, Nebraska also has the potential to be the 9<sup>th</sup> largest producer of solar power in the United States.<sup>32</sup>

**Using renewable energy resources, Nebraska could keep more money in-state.** Despite having no in-state coal supplies, two-thirds of Nebraska's electricity is generated from coal; nearly all of it is imported from Wyoming, costing the state \$198 million in 2008 (\$111 per state resident).<sup>33</sup> Instead, farmers could earn over \$100,000 by leasing just 20 acres to wind energy producers.<sup>34</sup>

## Conclusion

Nebraska must consider action on climate change not just in terms of cost, but also in terms of opportunities. If we give Nebraska's population,

businesses, and investors clear and consistent signals by properly offering initiatives and cultivating demand, investment and innovation in renewable technologies will follow.

**Nebraskans will have to pay for the effects of climate change.** The only remaining question is whether they will pay now, or pay later and run the risk of paying significantly more.

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(Endnotes)

- 1 U.S. Department of Agriculture, *State Fact Sheets: Nebraska*, September 10, 2010. <http://www.ers.usda.gov/statefacts/NE.HTM> (accessed September 22, 2010).
- 2 “Climate affects recent crop yield gains,” *Innovations*, February 14, 2003. [http://www.innovations-report.com/html/reports/agricultural\\_sciences/report-16478.html](http://www.innovations-report.com/html/reports/agricultural_sciences/report-16478.html) (accessed July 27, 2010).
- 3 U.S. Department of Agriculture, *State Fact Sheets: Nebraska*.
- 4 Pew Charitable Trusts, *The Clean Energy Economy: Nebraska*, 2009. [http://www.pewcenteronthestates.org/uploadedFiles/wwwpewcenteronthestatesorg/Fact\\_Sheets/Clean\\_Economy\\_Factsheet\\_Nebraska.pdf](http://www.pewcenteronthestates.org/uploadedFiles/wwwpewcenteronthestatesorg/Fact_Sheets/Clean_Economy_Factsheet_Nebraska.pdf) (accessed September 22, 2010).
- 5 David Roland Holst and Friedrich Kahrl, *Clean Energy and Climate Policy for U.S. Growth and Job Creation: An Economic Assessment of the American Clean Energy and Security Act and the Clean Energy Jobs and American Power Act, Executive Summary*, October 25, 2009, 4. [http://are.berkeley.edu/~dwrh/CERES\\_Web/Docs/ES\\_DRHFK091025.pdf](http://are.berkeley.edu/~dwrh/CERES_Web/Docs/ES_DRHFK091025.pdf) (accessed July 13, 2010).
- 6 National Wildlife Federation, *Global Warming and Nebraska*, January 20, 2009, 2. <http://www.nwf.org/Global-Warming/-/media/PDFs/Global%20Warming/Global%20Warming%20State%20Fact%20Sheets/Nebraska.ashx> (accessed July 9, 2010).
- 7 Natural Resources Defense Council, *Renewable Energy for America: Harvesting the Benefits of Homegrown, Renewable Energy*. <http://www.nrdc.org/energy/renewables/nebraska.asp> (accessed July 1, 2010).
- 8 Alliance for Climate Protection, *Repower Nebraska*, February 4, 2010. [http://www.repoweramerica.org/wp-content/uploads/2010/03/factsheets/statejobs\\_Nebraska.pdf](http://www.repoweramerica.org/wp-content/uploads/2010/03/factsheets/statejobs_Nebraska.pdf) (accessed July 1, 2010).
- 9 Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, *Global Climate Change Impacts in the United States*, U.S. Global Change Research Program, 2009, 123. <http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf> (accessed September 22, 2010).
- 10 Environmental Defense Fund, *Clean Energy Jobs in Nebraska*, 2009, 1. [http://www.edf.org/documents/10503\\_CleanEnergyJobs-NE.pdf](http://www.edf.org/documents/10503_CleanEnergyJobs-NE.pdf) (accessed July 1, 2010).
- 11 U.S. Department of Agriculture, *2007 Census of Agriculture: 2008 Farm and Ranch Irrigation Study*, July 23, 2010, 4. [http://www.agcensus.usda.gov/Publications/2007/Online\\_Highlights/Fact\\_Sheets/fris.pdf](http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/Fact_Sheets/fris.pdf) (accessed September 22, 2010); National Wildlife Federation, 2.
- 12 Environmental Defense Fund, *Clean Energy Jobs in Nebraska*, 1; Union of Concerned Scientists, *Backgrounder: Great Plains*, 2009, 4. [http://www.ucsusa.org/assets/documents/global\\_warming/us-global-climate-change-report-greatplains.pdf](http://www.ucsusa.org/assets/documents/global_warming/us-global-climate-change-report-greatplains.pdf) (accessed September 22, 2010).
- 13 U.S. Department of Agriculture, *State Fact Sheets: Nebraska*.
- 14 The impact of climate change on beef production is expected to cost producers in the in the central U.S. region \$43.9 million annually by 2040—approximately 40% of which (\$17 million) would come from Nebraska, based on the value of the cattle industries in each state. Peter Backlund, Anthony Janetos, and David Schimel, *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity*, U.S. Climate Change Science Program, May 2008, 65. <http://www.climatescience.gov/Library/sap/sap4-3/final-report/sap4.3-final-all.pdf> (accessed September 27, 2010); U.S. Department of Agriculture, *State Fact Sheets: Nebraska*; U.S. Department of Agriculture, *State Fact Sheets: Missouri*, September 10, 2010. <http://www.ers.usda.gov/StateFacts/MO.htm> (accessed September 27, 2010); U.S. Department of Agriculture, *State Fact Sheets: Iowa*, September 10, 2010. <http://www.ers.usda.gov/StateFacts/IA.htm> (accessed September 27, 2010); U.S. Department of Agriculture, *State Fact Sheets: Kansas*, September 2010. <http://www.ers.usda.gov/StateFacts/KS.htm> (accessed September 27, 2010).
- 15 The study defined the region as: Missouri, Iowa, Kansas, and Nebraska. Buckland et al., 65.

- 16 Kristie L. Ebi, *Assessing the Benefits of Avoided Climate Change: Cost-Benefit Analysis and Beyond: Social Vulnerability and Risk*, Pew Center on Global Climate Change, May 2010, 79. <http://www.pewclimate.org/docUploads/ebi-social-vulnerability-risk.pdf> (accessed August 16, 2010); Josh Funk, "Over 2,000 cattle die in Neb. Heat wave," *USA Today*, June 30, 2009. [http://www.usatoday.com/weather/news/extremes/2009-06-30-nebraska-cattle-deaths\\_N.htm](http://www.usatoday.com/weather/news/extremes/2009-06-30-nebraska-cattle-deaths_N.htm) (accessed September 27, 2010).
- 17 Wolfram Schlenker and Michael J. Roberts, *Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change*, Proceedings of the National Academy of Sciences, October 13, 2008. <http://www.pnas.org/content/106/37/15594.full> (accessed July 27, 2010).
- 18 Karl et al., 75.
- 19 National Wildlife Federation, 2.
- 20 Karl et al., 126.
- 21 National Wildlife Federation, 1.
- 22 Value of Nebraska's 2002 wood product manufacturing industry. U.S. Department of Agriculture Forest Service, *Nebraska Timber Industry—An Assessment of Timber Product Output and Use*, 2006, 1. <http://www.nfs.unl.edu/documents/ruralforestry/NE%20TPO%202006.pdf> (accessed August 16, 2010).
- 23 The labor force members included are employed within tourism (defined as art/entertainment/recreation and accommodation/food services) and the agriculture, wildlife, forestry, and forestry-related industries (2009). U.S. Census Bureau, *Local Employment Statistics*. <http://lehd.did.census.gov/led/datatools/qwiapp.html> (accessed July 1, 2010).
- 24 National Wildlife Federation, 2; Environmental Entrepreneurs and Redefining Progress, *Issue Brief: Effects Of Global Warming On The State Of Nebraska*, April 2005, 1. [http://www.e2.org/ext/doc/e2\\_nebraska.pdf;jsessionid=2480A80D5DCA4329B6EEFD53FD03AE49](http://www.e2.org/ext/doc/e2_nebraska.pdf;jsessionid=2480A80D5DCA4329B6EEFD53FD03AE49) (accessed September 27, 2010).
- 25 Pew Charitable Trusts, *The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America*, June 2009, 8, 29. [http://www.pewglobalwarming.org/cleanenergyeconomy/Clean\\_Energy\\_Economy\\_Report.pdf](http://www.pewglobalwarming.org/cleanenergyeconomy/Clean_Energy_Economy_Report.pdf) (accessed July 1, 2010).
- 26 Holst et al., 4.
- 27 Environmental Entrepreneurs et al., *Clean Energy and Climate Policies Lead to Economic Growth in Nebraska*, 1. <http://www.e2.org/ext/doc/State%20Fact%20Sheet%20Nebraska.pdf> (accessed July 15, 2010).
- 28 Natural Resources Defense Council.
- 29 E. Lantz, *Economic Development Benefits from Wind Power in Nebraska: A Report for the Nebraska Energy Office*, U.S. Department of Energy and Office of Energy Efficiency & Renewable Energy, vi. <http://www.neo.ne.gov/reports/EconomicWindNebraska08.pdf> (accessed September 27, 2010).
- 30 Natural Resources Defense Council.
- 31 Bentham Paulos, Steven Clemmer and Alan Noguee, *Powerful Solutions for Nebraska: Seven Ways to Switch to Renewable Electricity*, Union of Concerned Scientists, December 1998, 1, 4. [http://www.ucsusa.org/assets/documents/clean\\_energy/ps-ne.pdf](http://www.ucsusa.org/assets/documents/clean_energy/ps-ne.pdf) (accessed September 27, 2010).
- 32 Natural Resources Defense Council.
- 33 Union of Concerned Scientists, *Burning Coal, Burning Cash in Nebraska*, May 2010. [http://www.ucsusa.org/assets/documents/clean\\_energy/UCS-BCBC-factsheet-Nebraska.pdf](http://www.ucsusa.org/assets/documents/clean_energy/UCS-BCBC-factsheet-Nebraska.pdf) (accessed July 1, 2010).
- 34 Environmental Entrepreneurs and Redefining Progress, 2.