



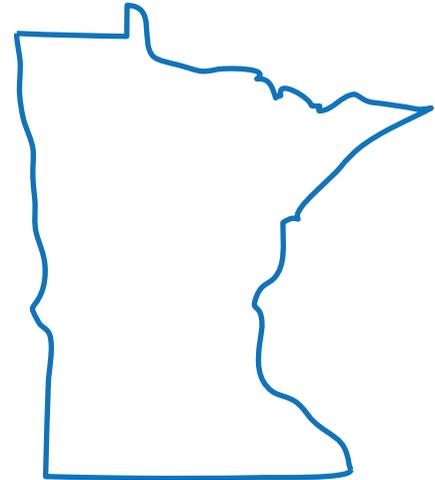
CLIMATE & BUSINESS

MINNESOTA

Minnesota companies explain
climate change and severe
weather risk

February 2018

 **BUSINESS FORWARD**



This report examines how severe weather is distorting commodity prices, disrupting supply chains, damaging plants and equipment, and hurting consumer demand for Minnesota businesses. It is meant to serve as a resource for local, state, and Congressional officials and media interested in energy and climate change policy. Specifically, the points made here should help media and officials answer a simple question about climate change: *How can we afford **not** to fix it?*

Minnesota's top entrepreneurs, executives, investors, and small business owners are changing how they build, where they locate, and how they insure their assets. They are creating new business lines and models to capture the opportunities severe weather is creating. And they are issuing warnings to their investors about how climate change affects their bottom lines that climate policy opponents in Saint Paul and Washington, DC, should not ignore. Policymakers should also recognize the economic opportunities a transition to cleaner sources of energy brings and the jobs that come with it.

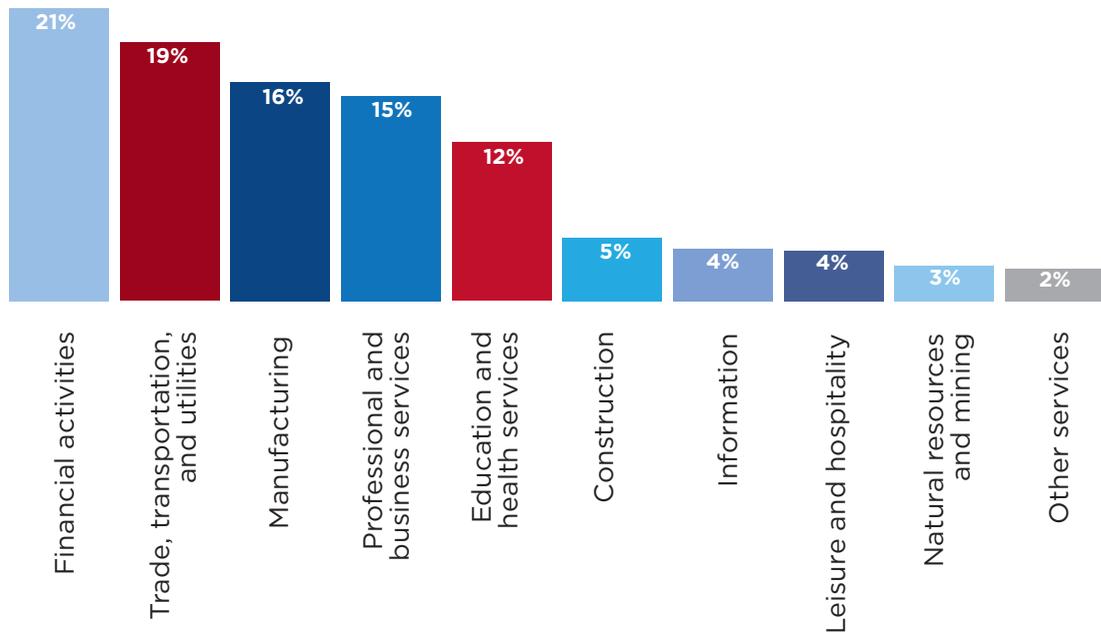
Severe weather is affecting Minnesota's key industries, from farms and orchards to aerospace, energy utilities, food distributors, railroads, and shipping. Climate change threatens many of Minnesota's greatest competitive advantages, including our fast-moving global supply chains, model climate for corn and sugar beets, and ready access to the Upper Mississippi River and Great Lakes.

Business Forward has worked with more than 1,600 entrepreneurs, executives, and small business owners across Minnesota. These leaders have helped brief Congress, the White House, and state legislatures on a range of issues, including tax reform, trade agreements, infrastructure investment, and immigration reform. More than 600 of them have participated in our climate change and clean energy program, where they have learned about energy options and shared their experience managing severe weather costs. They have also expressed their support for the Clean Power Plan and policies that promote a transition to renewable fuels.

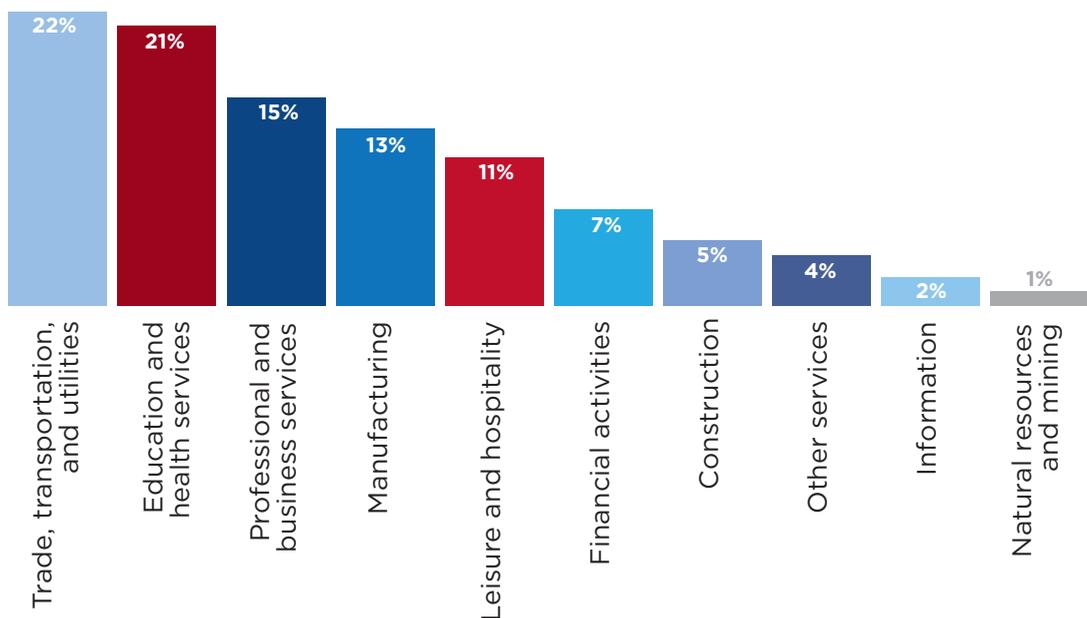
Companies featured in this report include Minnesota's largest dairy product producer, food product manufacturer, railway company, snowmobile manufacturer, and retailer.

A SNAPSHOT OF MINNESOTA'S ECONOMY

MINNESOTA GDP BY INDUSTRY, 2016



MINNESOTA EMPLOYMENT BY INDUSTRY, 2016



Gross Domestic Product (GDP) data is from the Bureau of Economic Analysis. Employment data is from the Bureau of Labor. Natural Resources and Mining includes agriculture and agribusiness data.

HOW SEVERE WEATHER AFFECTS KEY MINNESOTA INDUSTRIES, AS EXPLAINED BY MINNESOTA EXECUTIVES

AEROSPACE

Seventeen thousand Minnesotans work in aerospace, primarily in jobs related to manufacturing and transportation.²

Lockheed Martin has an Advanced Technology Laboratory office in Eagan. It informed investors that it “anticipates that the extreme weather events associated with climate change could have an increased impact on operations in the coming decades.”³

The Boeing Company works with 160 suppliers and vendors throughout Minnesota. It purchases \$400 million worth of parts, supplies, and services from Minnesota businesses each year.⁴ It warns, “damaging weather or other acts of nature... could affect our internal operations or our ability to deliver products and services to our customers.”⁵

AIRPORTS

Delta Air Lines’ second largest hub is Minneapolis-St. Paul International Airport, where it operates more than 400 daily departures to 129 destinations, accounting for 80% of the airport’s traffic.⁶ Delta warns investors that severe weather conditions can “significantly disrupt service and create air traffic control problems.”⁷ Additionally, “increases in the frequency, severity or duration of thunderstorms, hurricanes, typhoons or other severe weather events, including from changes in the global climate, could result in increases in delays and cancellations, turbulence-related injuries and fuel consumption to avoid such weather.”

MINNESOTA HAS HAD

6

BILLION-DOLLAR WEATHER AND CLIMATE DISASTERS SINCE 2012.¹

Seventeen Fortune 500 companies are headquartered in Minnesota and three fourths of them have issued warnings about severe weather.

Companies operating factories, farms, shops, restaurants, barges, or hotels in Minnesota have reported that rising temperatures, extreme weather, flooding, and drought are affecting their operations here.

“Changes in the global climate, could result in increases in delays and cancellations, turbulence-related injuries and fuel consumption to avoid such weather.”

Delta Air Lines

AUTOMOTIVE MANUFACTURING

Johnson Controls, a subsidiary of the **Visteon Corporation**, produces automotive electronics. It operates facilities in Minneapolis, St. Cloud, and Rochester.⁸ Johnson Controls warns how climate change could slow growth. “These factors may impact our decisions to construct new facilities or maintain existing facilities in areas most prone to physical climate risks.”⁹

CASH CROPS

Roughly one in ten of the country’s 100 largest agricultural cooperatives operate out of Minnesota, including the two largest: CHS and Land O’Lakes.¹⁰

CHS is a Fortune 100 business with headquarters in Inver Grove Heights. CHS informs investors, “Our corporate headquarters, the facilities we own or the significant inventories that we carry could be damaged or destroyed by catastrophic events, extreme weather conditions, or contamination.”¹¹

Land O’Lakes, with global headquarters in Arden Hills, is one of the largest producers of butter and cheese in the United States, handling 12 billion pounds of milk annually. According to Land O’Lakes CEO Chris Policinski, “Climate change is yet another component of the mounting challenges that we face in feeding a soaring global population, while natural resources such as water and arable land are becoming increasingly scarce. As these challenges converge, it is more important than ever that we focus on solutions within our control to increase productivity and sustainability in agriculture.”¹²

“Climate change is yet another component of the mounting challenges that we face in feeding a soaring global population, while natural resources such as water and arable land are becoming increasingly scarce.”

Land O’Lakes

HOW SEVERE WEATHER AFFECTS CASH CROPS (AND FOOD PRICES)

1

Consistently warmer temperatures stress plants and livestock, reducing crop yields and livestock health.

2

Rising surface temperatures are disrupting weather patterns, affecting rainfall, and even the timing and duration of growing seasons.

3

More severe storms are damaging crops and livestock.

CHEMICALS

With headquarters in St. Paul, **Ecolab** is a chemical manufacturer and industrial conglomerate with annual revenues of \$14.2 billion dollars. Working across so many industries, Ecolab warns that severe weather's impact on the "energy, foodservice, hospitality, travel, health care, food processing, pulp and paper, mining, steel and other industries" could adversely affect its business.¹³

Dow Chemical maintains a water and process solutions plant in Edina, employing more than 600 Minnesotans. Dow warns: "Operations on the U.S. Gulf Coast, logistics across the region, and the supply of certain raw materials" have been significantly disrupted by major hurricanes. Dow also studies "the long-term implications of changing climate parameters on water availability, plant siting issues, and impacts and opportunities for products."¹⁴

CONSTRUCTION & ENGINEERING

Headquartered in Winona, **Fastenal** is a Fortune 500 company reselling fasteners for construction projects around the world. With more than 13 distribution centers worldwide, climate change can directly impact Fastenal's supply chain. In January 2014, Fastenal's master distribution center in Indianapolis shut down for three days, and its distribution center in Atlanta closed for two days. Fastenal reported "noticeable" slowdowns in these regions. "Completely closed distribution centers are a rare event," Fastenal said in a recent investor call. "Weather was certainly difficult throughout January, with nonresidential customers seeing the greatest impact."¹⁵

EFFICIENCY AND CLIMATE RISK

For decades, Minnesota companies have built increasingly large, complex and fast-moving supply chains. To reach the lowest-cost producers, Minnesota companies depend more on Asian, South American, and African markets. To maximize each individual supplier plant's efficiency, Minnesota companies have encouraged their suppliers to specialize. And, to reduce overhead costs, more Minnesota companies are following just-in-time inventory practices, which require their supply chains to operate with greater speed.

As their supply chains become more global, Minnesota factories, stores, and plants grow more vulnerable to severe weather in other countries.

DATA & INFORMATION TECHNOLOGY

The nation's second largest cable provider, with 1,300 employees across the state, **Charter Communications**, warns of its network and information systems' vulnerability to "damage or interruption from... natural disasters (including extreme weather arising from short-term or any long-term changes in weather patterns)." "Further, the impacts associated with extreme weather or long-term changes in weather patterns, such as rising sea levels or increased and intensified storm activity, may cause increased business interruptions or may require the relocation of some of our facilities."¹⁶

ENTERTAINMENT

Climate change is having a profound effect on the entertainment and recreation industry in the northern half of the U.S. and Canada, as winters have gotten shorter and warmer. For example, **Arctic Cat** and **Polaris**, based in Minneapolis and Medina, have seen snowmobile sales plunge in recent years.¹⁷ Polaris warns "[I]ack of snowfall in any year in any particular geographic region may adversely affect snowmobile retail sales...weather conditions are exacerbated by global climate change or other factors, and sales may be affected to a greater degree than we have previously experienced."¹⁸

FINANCIAL SERVICES

Minnesota is home to a large financial services sector, and is the corporate headquarters for **U.S. Bancorp**, parent company of **US Bank**, the 7th largest bank in the United States.

“Weather conditions are exacerbated by global climate change or other factors, and sales may be affected to a greater degree than we have previously experienced.”

Polaris

TRENDS WORSENING: S&P ON CLIMATE RISK

“The economic cost of natural catastrophes has risen significantly over the past 10 years. Yet, through a combination of existing preventative measures, most companies we rate have managed to mitigate the impact of such events on their corporate credit profiles. Nevertheless, with scientists predicting an increase in extreme climatic events, firms' vulnerability to natural catastrophes is in our view likely to be sorely tested.”

In June 2016, U.S. Bancorp issued a new financial environmental policy restricting the bank's potential investments in coal and taking carbon pollution into account in investment decisions. From Bancorp CEO Richard Davis: "In order to maintain a viable economy our financial institutions must be willing to remove all support from the toxic industries that are devastating our planet, and instead help fund the transition to a sustainable economy."¹⁹

Deluxe Corporation is one of the largest check printers in the United States, with revenues of \$1.7 billion and headquarters in Shoreview. The corporation warns that severe weather could negatively impact its website operations, supply chain, and technology systems.²⁰

FISHERIES

While commercial fishing is a relatively small industry in Minnesota, the Minnesota Department of Natural Resources estimates that recreational fishing supports 43,000 jobs and \$2.8 billion dollars in annual spending in the state.²¹

Climate change is affecting the recreational fishing industry, and one of the breeds most associated with Minnesota fishing: Wallaye.

Lake Millie Lacs is a popular resort town for recreational fishing of Wallaye. However, due to climate change, Wallaye stock in the lake has fallen, and local resorts are feeling the effects. "For the first time in years I am not sold out at the opener," said Linda Eno, who, with her husband, owns the **Twin Pines Resort**.²²

“ In order to maintain a viable economy our financial institutions must be willing to remove all support from the toxic industries that are devastating our planet, and instead help fund the transition to a sustainable economy.”

U.S. Bancorp

Climate change is creating some economic opportunities, however. **Ralco Nutrition** is a primary investor in **Tru Shrimp**, which is building a \$50 million dollar shrimp farming operation in Luverne.²³ The United States currently imports 90% of its shrimp from Southeast Asia; however, climate change has impacted the farming and supply chain of global shrimp production. As a result, a shrimp farm can diversify the industry, while having a tremendous economic impact within Minnesota.

FOOD PROCESSING & DISTRIBUTION

General Mills is a multinational manufacturer and marketer of branded consumer foods headquartered in Golden Valley. Its portfolio includes more than 89 other leading U.S. brands with annual revenues of \$16 billion. CEO Ken Powell warns that “human-caused greenhouse gas causes climate change and climate volatility and that’s going to stress the agricultural supply chain...we depend on that for our business.”²⁴ It plans to invest in organic agriculture that “promotes soil that helps farms better endure droughts, heavy rains and pests.”²⁵

Hormel Foods Corporation is an \$8 billion food company based in Austin. Hormel sells food under many brands, including **Applegate, Chi-Chi’s, Dinty Moore, Herdez, Jennie-O, Justin’s, Lloyd’s, Muscle Milk, Skippy, Spam, Stagg, La Victoria,** and **Wholly Guacamole**. Hormel warns about climate change’s impact on pork production: “Results in these operations are affected by the cost and supply of feed grains, which fluctuate due to climate conditions at local, regional, national and worldwide levels.”²⁶

“Human-caused greenhouse gas causes climate change and climate volatility and that’s going to stress the agricultural supply chain... we depend on that for our business.”

General Mills

HEALTHCARE

About 439,000 people are employed in the healthcare industry in Minnesota; several Fortune 500 healthcare companies are headquartered in the state, with combined revenues over \$160 billion dollars. Organizations such as **United HealthGroup**, **St. Jude's**, and **Blue Cross Blue Shield** have warned about the physical impact that climate change could have on their business. St. Jude's highlights its supply chain: "our manufacturing facilities in Puerto Rico or Malaysia may suffer damage as a result of hurricanes and could result in lost production and additional expenses to us."²⁷

HOTELS

Hyatt²⁸, with six hotels in Minnesota, and **Hilton**²⁹, with five, both warn that climate change and resource scarcity (like water or energy scarcity) may affect consumer demand for hotel rooms. **Hilton** also warns: "The potential for changes in the frequency, duration, and severity of extreme weather events that may be a result of climate change could lead to significant property damage at our hotels and other assets, affect our ability to obtain insurance coverage in areas that are most vulnerable, such as the coastal resort areas where we operate, and have a negative effect on revenues."³⁰

Choice Hotels International (Ascend, Comfort Inn, Quality Inn) operates more than 20 hotels in Minnesota. It warns that severe weather can affect the "cost effective and timely construction of hotels."³¹

Starwood, which operates 13 hotels in Minnesota, has warned investors that "[c]hange in average temperature can also lead to increased operational costs for Starwood, due to an increase in utility costs." The company has cited projections by the International Energy Agency that space cooling demand could increase by 170% by 2035.³²

SEVERE WEATHER TREND

HIGHER TEMPERATURES

Temperatures across the U.S. are 1.3 to 1.9 degrees warmer, on average, than they were when measurements were first recorded in 1895, and most of this increase has occurred since 1970. Nineteen of the 20 hottest years on record occurred in the past two decades. Heat waves have become more frequent and intense.

In Minnesota, statewide temperatures have increased by one to two degrees over the past century.

“Change in average temperature can also lead to increased operational costs for Starwood, due to an increase in utility costs.”

Starwood

INSURANCE

The **Travelers Insurance Company** is the second largest writer of commercial property casualty insurance and the third largest writer of personal insurance in the U.S. It operates a large office in St. Paul. Travelers warns: “Severe weather events over the last several years have underscored the unpredictability of future climate trends and created uncertainty regarding insurers’ exposures to financial loss as a result of catastrophes and other weather-related events.”³³

MANUFACTURING

3M is headquartered in Saint Paul, employs 17,000 Minnesota workers and 90,000 workers worldwide, and produces over 55,000 products. In 2011, 3M lost \$35 million in revenues and \$20 million in operating profit when its Thailand plant flooded and disrupted its supply chain.³⁴ In its 2016 sustainability report, it recorded “liabilities of \$43 million for estimated ‘environmental remediation’ costs based upon an evaluation of currently available facts with respect to each individual site and also recorded related insurance receivables of \$11 million.”³⁵

Valspar is an international manufacturer of paint and coatings with headquarters in Minneapolis. It warns: “Supply disruptions, temporary plant and/or power outages, work stoppages, natural disasters and severe weather events could increase the cost of doing business or otherwise harm our operations, our customers and our suppliers.”³⁶

With revenues of \$1.7 billion and headquarters in Bloomington, **The Toro Company** manufactures turf maintenance and snow removal equipment. Extreme weather can have a direct impact on its sales: “lower snowfall accumulations result in lower winter season revenues.”³⁷

“Severe weather events over the last several years have underscored the unpredictability of future climate trends and created uncertainty regarding insurers’ exposures to financial loss as a result of catastrophes and other weather-related events.”

The Travelers Insurance Company

The Mosaic Company, a Fortune 500 company based out of Plymouth, mines and produces two key crop nutrients used in the agricultural industry as fertilizer. It warns about the physical effects of climate change to its mining operations: “Adverse weather conditions, including the impact of hurricanes and excess heat, cold, snow, rainfall and drought, have in the past and may in the future adversely affect our operations, particularly our Phosphates business. In the past, hurricanes have resulted in minor physical damage to our facilities in Florida and Louisiana.”³⁸

MILITARY BASES

There are currently 11 active military bases in Minnesota. According to retired Marine Corps General Stephen Cheney, CEO of the **American Security Project**, cutting programs that fight climate change threaten military bases in Minnesota and around the country.³⁹

PORTS & SHIPPING

Minnesota has four ports on Lake Superior including Taconite Harbor, Silver Bay, Two Harbors, and Duluth/Superior. Together, they handle approximately 51 million tons of cargo each year.

The Mississippi River System stretches over 222 miles in Minnesota and supports five port areas. The upper portion of the Mississippi river ships over 108 million tons of commodities annually. The river accounts for more than 50 percent of Minnesota’s agricultural exports.⁴⁰

In 2014, the shipping season on the Mississippi had its earliest closing in 45 years because icy conditions slowed or entirely prevented shipping. According to Bob Zelenka of the **Minnesota Grain and Feed Association**, “The river is the cheapest way of moving crops, but the river’s early closure means finding alternative ways to get those crops to New Orleans and foreign export markets.”

SEVERE WEATHER TREND

DROUGHT & LOW WATER LEVELS

Low water levels in 2013, caused by an unusually hot and dry summer the year before, created navigational hazards in Great Lakes waterways for commercial carriers.

Shippers compensated for these low water levels by reducing the amount of cargo they carried (allowing their ships to float higher in the water, which reduced their draft). To gain a single inch of waterline, a large cargo ship must dump 270 tons of cargo. In 2013, Lakes Huron and Michigan were 23 inches below their normal levels. Ships crossing those lakes carried 6,000 fewer tons per trip than they carried in 1997 (from 71,000 tons to 65,000 tons). One ship, for example, left 18 percent of its iron ore cargo on the dock. Erratic water levels add uncertainty to freight shipping schedules and have economic repercussions across the region.

Upper River Services, which operates two shipping barges out of St. Paul, suffers from volatility due to extreme weather. After a late start in the spring and delays caused by summer flooding, the 2014 navigation season on the Upper Mississippi came to an abrupt end on November 20th. Several days of below-freezing temperatures created difficult conditions.⁴¹

The issue extends beyond the waterways. **C.H. Robinson Worldwide** is a Fortune 500 company with headquarters in Eden Prairie and annual revenues of \$13 billion dollars. It specializes in third party logistics. The company warns that climate change could impact its sourcing business, which is dependent upon the supply and price of fresh produce.⁴²

RAIL

Minnesota has 4,444 route miles of railroads serviced by 21 railroad companies, with annual gross operating revenues of \$378 million.⁴³

BNSF Railway is the second largest freight railway in Minnesota, with over 1,500 miles of track in the state. It warns investors, “Severe weather, climate change and natural disasters, such as tornados, flooding and earthquakes, could cause significant business interruptions and result in increased costs and liabilities and decreased revenues.”⁴⁴

RESTAURANTS

Restaurants and foodservice jobs account for about 11 percent of Minnesota jobs.⁴⁵ Restaurant owners say they are more sensitive than other hospitality businesses to extreme temperatures and severe weather.

Fast-food chains like **McDonald’s**,⁴⁶ **Burger King**,⁴⁷ **Taco Bell**, and **KFC**⁴⁸ operate hundreds of restaurants across Minnesota. They warn investors that severe weather or climate change will adversely impact their supply chains, food pricing, and consumer demand.

“Severe weather, climate change and natural disasters, such as tornados, flooding and earthquakes, could cause significant business interruptions and result in increased costs and liabilities and decreased revenues.”

BNSF Railway

SEVERE WEATHER TREND

MORE SEVERE STORMS

Heavy downpours are increasing nationally. Across Minnesota the amount of rain in the heaviest storms has increased by 71 percent over the past decade. The severity of these storms will continue to rise. Heavy rains and rapid snowmelt upstream contribute to Mississippi River flooding.

For example, Minnesota is home to more than 75 **Wendy's** franchises. The company warns that changing weather patterns and conditions can affect prices for feed ingredients used to produce beef and chicken, causing them to react “by adjusting our purchasing practices and menu prices.”⁴⁹

With corporate headquarters in Minneapolis, **Buffalo Wild Wings** warns how climate change can impact its supply chain: “Possible shortages or interruptions in the supply of food items and other supplies to our restaurants caused by inclement weather.”

RETAILERS

With more than 1,700 stores across America and corporate headquarters in Minnesota, **Target** is the eighth largest retailer in the United States.⁵⁰ Target warns: “Changes in precipitation extremes and droughts can impact our vendors and the products they supply. Droughts can result in less available water for certain manufacturing processes. In addition, droughts could result in reduced production capacity of necessary resources... disasters in states where our sales are concentrated could result in significant physical damage to one or more of our stores or distribution centers.”⁵¹

The Mall of America is the largest U.S. retail mall, and the 12th largest in the world, with 40 million annual visitors and 11,000 workers.⁵² Extreme weather can cause the mall to close early, or prevent customers from going to the mall to shop; this in turn can lead to millions of dollars in lost revenue for retailers in the mall.⁵³

Best Buy, the 14th largest retailer in the U.S., is headquartered in Richfield.⁵⁴ With an A- score from the Carbon Disclosure Project in 2016, Best Buy believes that “effectively managing our environmental impacts, creates long-term value for all of our stakeholders.”

SEVERE WEATHER TREND

CONSUMER DEMAND

The best way to understand climate change-related costs to consumer businesses is to appreciate the impact losing marginal business can have on profits. A ski resort in Lusten depends heavily on the number of snowfall days it enjoys, because it can sell more ski lift day passes. For a tight-margin business, those extra passes can represent the difference between a good season and an unprofitable one.

Columbia Sportswear, operating stores out of Minneapolis, Bloomington, and Albertville, and supplying hundreds of other retailers. It warns, “[c]onsumer demand for our cold-weather apparel and footwear may be negatively affected to the extent global weather patterns trend warmer, reducing typical patterns of cold-weather events or increasing weather volatility.”⁵⁵

With headquarters in Eden Prairie, **Supervalu** is the fifth largest food-retailing company in the United States, and warns about the impact of severe weather can have to its stores and supply chain. “Severe weather conditions and natural disasters may adversely affect Supervalu’s financial condition and results of operations, including as a result of physical damage to Supervalu’s properties.”⁵⁶

America’s largest retailer, **Walmart**, operates 89 Minnesota stores, one distribution center, and employs more than 23,000 workers across the state.⁵⁷ It has warned of “weather conditions, patterns and events, climate change... [and] resulting damage to our units and store and club closings and limitations on our customers’ access to our stores and clubs resulting from such events.”⁵⁸

TIMBER

Norbord Inc. is a manufacturer of wood-based panels and the world’s largest producer of Oriented Strand Board (OSB). Its Solway facility uses local timber to produce OSB. It warns: “Fibre supply could also be influenced by natural events, such as forest fires, severe weather conditions, insect epidemics and other natural disasters, which may increase wood fibre costs, restrict access to wood fibre or force production curtailments.”⁵⁹

“Changes in precipitation extremes and droughts can impact our vendors and the products they supply. Droughts can result in less available water for certain manufacturing processes. In addition, droughts could result in reduced production capacity of necessary resources... disasters in states where our sales are concentrated could result in significant physical damage to one or more of our stores or distribution centers.”

Target

UTILITIES

Utility companies warn of service interruptions due to equipment failure from severe or destructive weather affecting customers in Minnesota.

Allete is the parent company of **Minnesota Power**, the second largest energy company in Minnesota. As Allete continues to shift towards more diverse power offerings, including sustainable energy, it warns: “An extreme weather event within our utility service areas can also directly affect our capital assets, causing disruption in service to customers due to downed wires and poles or damage to other operating equipment. These all have the potential to adversely affect our business and operations.”⁶⁰

Xcel Energy, based in Minneapolis, warns “[i]ncreased energy use due to weather changes may require us to invest in additional generating assets, transmission and other infrastructure to serve increased load. Decreased energy use due to weather changes may result in decreased revenues.”⁶¹

WINERIES

The effects of climate change have been beneficial to the wine industry in Minnesota. Due to shorter winters and warmer temperatures, grape growers in Minnesota are working with breeds that are more resilient and can be grown locally. According to Paul Huttner, the Chief Meteorologist for Minnesota Public Radio, “Climate change will likely continue to provide a boost in the overall picture for northern viticulture.”⁶²

“We are in the business of apples, and like all blooming fruit that business is intimately tied to weather. A bad crop at the hands of a late frost or hail damage can change our input costs materially. To stay true to using freshly pressed fruit, we have been forced to diversify our sourcing model from hyperlocal to more regional as we source from more Midwestern suppliers. Even with that diversification, poor crop yields this season brought us a 15 percent increase in produce cost for 2018. Severe weather brings with it the crop volatility, pricing volatility, and operational volatility that makes operating a growing cidery all the more difficult.”

*Jim Watkins, Managing Director,
Sociable Cider Werks*

Located in New Ulm, the **August Schell Brewing Company** is one of the oldest local breweries in Minnesota and brewed over 170,000 barrels of beer in 2016. It is adapting to climate change by growing barley adapted to southern Minnesota's climate, which has warmed in previous decades, to produce more locally sourced beer (versus procuring barley from North Dakota or Canada).⁶³

“ Making the case for growing grapes in Minnesota is not an argument I should be able to win, but the long term outlook is that you will see successful vineyard plantings moving north. The challenge is going to be the erratic weather. A few early warm days in the spring or an unseasonable cold snap can damage an entire year's crop.”

Jonathan Millner, Vintner, Millner Heritage Winery & Cidery

ENDNOTES

- 1 NOAA National Centers for Environmental Information (NCEI). U.S. Billion-Dollar Weather and Climate Disasters (2017).
- 2 University of Michigan Extension. "The Economic Contribution of the Duluth-Superior Aerospace Industry." April 2014. <https://www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2014-Duluth-Aerospace-Industry.pdf>
- 3 CDP. "Major Public Companies Describe Climate-related Risks and Costs." May 2014.
- 4 Boeing. "Improving the Quality of Life in Minnesota." 2016. http://www.boeing.com/resources/boeingdotcom/government-operations/state_cards/Card_MN.pdf
- 5 The Boeing Company. Annual Report Form 10-K for fiscal year ending December 31, 2016.
- 6 Delta. "Minneapolis-St. Paul International Airport." May 31, 2016. <http://news.delta.com/minneapolis-st-paul-international-airport>
- 7 Delta Air Lines, Inc. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 8 Visteon. "Visteon Completes Acquisition of Electronics Business of Johnson Controls." *PR Newswire*. Jul. 1, 2014. <https://www.prnewswire.com/news-releases/visteon-completes-acquisition-of-electronics-business-of-johnson-controls-265370241.html>
- 9 Johnson Controls International PLC. Annual Report Form 10-K for fiscal year ended September 30, 2017.
- 10 Brian Martucci. "The Power of Cooperation." *Minnesota Business*. Aug. 24, 2016. <http://www.minnesotabusiness.com/power-cooperation>
- 11 CHS Inc. Annual Report Form 10-K for fiscal year ended August 31, 2017.
- 12 Chris Policinski. "Land O' Lakes CEO's Comments on Climate Change, Food Production." *AgriMarketing*. May 29, 2014. <https://www.agrimarketing.com/ss.php?id=89257>
- 13 Ecolab. Annual Report 2016.
- 14 The Dow Chemical Company. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 15 Scott Merrill. "Adverse Weather Hits Distributors Hard." *MDM*. Feb. 26, 2014. <https://www.mdm.com/blogs/1-management-strategy/post/31596-adverse-weather-hits-distributors-hard>
- 16 Charter Communications. Annual Report Form 10-K for fiscal year ending December 31, 2016.
- 17 Travis Hoium. "4 Reasons Polaris Industries Inc. Stock Could Fall." *The Motley Fool*. Dec. 28, 2016. <https://www.fool.com/investing/2016/12/28/4-reasons-polaris-industries-inc-stock-could-fall.aspx>
- 18 Polaris. Annual Report 2016.
- 19 U.S. Bancorp. Environmental Responsibility Policy. May 2016.
- 20 Deluxe Corporation. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 21 MN Department of Natural Resources. "Fishing creates 43,000 Minnesota jobs, \$2.8 billion in retail spending." May 5, 2011. <http://news.dnr.state.mn.us/2011/05/05/fishing-creates-43000-minnesota-jobs-28-billion-in-retail-spending/>
- 22 Josephine Marcotty. "Climate change is a culprit in decline of Minnesota walleye." *Star Tribune*. May 2, 2015. <http://www.startribune.com/climate-change-is-a-culprit-in-walleye-s-decline/302314741/>
- 23 Cliff White. "Tru Shrimp Company to build USD 50 million shrimp farm in Minnesota." *Seafood Source*. Jun. 16, 2017. <https://www.seafoodsource.com/news/aquaculture/tru-shrimp-company-to-build-usd-50-million-shrimp-farm-in-minnesota>
- 24 Steve Karnowski. "General Mills sets ambitious goal for greenhouse gas cuts." *AP News*. Aug. 30, 2015. <https://apnews.com/ee0cd38a76414adfa49583abc2c7c637/general-mills-sets-ambitious-goal-greenhouse-gas-cuts>
- 25 Jo Confino. "General Mills Warns Climate Change Will Lead To Global Food Shortages." *Huffington Post*. Nov. 17, 2015. https://www.huffingtonpost.com/entry/general-mills-warns-climate-change-will-lead-to-global-food-shortages_us_55e45e5ce4b0c818f6186305
- 26 Hormel Foods. Annual Report 2016.
- 27 St. Jude Medical, Inc. Annual Report Form 10-K for fiscal year ended January 2, 2016.
- 28 Hyatt Hotels Corporation. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 29 Hilton Worldwide Holdings. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 30 CDP. "Major Public Companies Describe Climate-related Risks and Costs." May 2014.

- 31 Choice Hotels International, Inc. Annual Report Form 10-K for fiscal year ending December 31, 2016.
- 32 CDP. "Major Public Companies Describe Climate-related Risks and Costs." May 2014.
- 33 The Travelers Companies, Inc. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 34 3M Company. Annual Report Form 10-K for fiscal year ended December 31, 2012.
- 35 3M. 2016 Sustainability Report. <http://multimedia.3m.com/mws/media/1214315O/2016-3m-sustainability-report.pdf>
- 36 The Valspar Corporation. Annual Report Form 10-K for fiscal year ended October 28, 2016.
- 37 The Toro Company. Annual Report 2016.
- 38 The Mosaic Company. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 39 Veronica Carter. "Experts: U.S. Military Facilities Threatened by Climate Change." *Public News Service - MN*. Apr. 7, 2017. <http://www.publicnews-service.org/2017-04-07/climate-change-air-quality/experts-u-s-military-facilities-threatened-by-climate-change/a57162-1>
- 40 MN Department of Transportation. "Commercial waterways." <http://www.dot.state.mn.us/ofrw/waterways/commercial.html>
- 41 Nick Woltman. "From two St. Paul shipyards, a barge trafficker keeps industry alive." *Twin Cities Pioneer Press*. Nov. 29, 2014. <http://www.twincities.com/2014/11/29/from-two-st-paul-shipyards-a-barge-trafficker-keeps-industry-alive/>
- 42 C.H. Robinson Worldwide, Inc. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 43 MN Department of Transportation. "Railroad Companies Serving Minnesota." <https://www.dot.state.mn.us/ofrw/railroad/systems.html>
- 44 BNSF Railway Company. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 45 National Restaurant Association. "Missouri: Restaurant Industry at a Glance." http://www.restaurant.org/Downloads/PDFs/State-Statistics/2016/MO_Restaurants2016
- 46 McDonald's Corporation. Annual Report Form 10-K for fiscal year ended December 31, 2015.
- 47 Burger King Worldwide, Inc. Annual Report Form 10-K for fiscal year ended December 31, 2013.
- 48 YUM! Brand. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 49 The Wendy's Company. Annual Report Form 10-K for fiscal year ending January 1, 2017.
- 50 STORES. "STORES Top 100 Retailers 2017." <https://stores.org/stores-top-retailers-2017/>
- 51 CDP. Climate Change 2017 Information Request: Target Corporation. https://corporate.target.com/_media/TargetCorp/csr/pdf/CDP-Response-ClimateChange-2015.pdf
- 52 Mall of America. <https://www.mallofamerica.com/about>
- 53 Susan Hogan and Tim Harlow. "Twin Cities awakens to heavy rains, flash flood warnings." *Star Tribune*. Jun. 19, 2014. <http://www.startribune.com/twin-cities-awakens-to-heavy-rains-flash-flood-warnings/263774071/>
- 54 STORES. "STORES Top 100 Retailers 2017." <https://stores.org/stores-top-retailers-2017/>
- 55 Columbia Sportswear Company. Annual Report Form 10-K for fiscal year ending December 31, 2016.
- 56 Supervalu Inc. Annual Report Form 10-K for fiscal year ended February 25, 2017.
- 57 Walmart. <https://corporate.walmart.com/our-story/locations/united-states/minnesota>
- 58 Walmart. Annual Report Form 10-K for fiscal year ended January 31, 2016.
- 59 Norbord. Annual Report 2016.
- 60 ALLETE, Inc. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 61 Xcel Energy, Inc. Annual Report Form 10-K for fiscal year ended December 31, 2016.
- 62 Paul Huttner. "Climate Change: A boost for northern wines?" *MPR News*. Nov. 17, 2015. <https://blogs.mprnews.org/updraft/2015/11/climate-change-a-boost-for-northern-wines/>
- 63 Louis Garcia. "Schell's is on a mission to use more local barley." *The Growler*. Mar. 9, 2017. <https://growlermag.com/schells-is-on-a-mission-to-use-more-local-barley/>