

ISSUE BRIEF : Q1 2020

OHIO COMPANIES EXPLAIN CLIMATE CHANGE AND SEVERE WEATHER RISK



BUSINESSFORWARD
FOUNDATION

EXECUTIVE SUMMARY

This report examines how severe weather is disrupting supply chains, distorting commodity prices, damaging plants and equipment, and hurting consumer demand for Ohio 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: Can we fix climate change without wrecking our economy?

Ohio'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 mitigate the effects of climate change. And they are issuing warnings to their investors about climate change that skeptics in Columbus and Washington, D.C. should not ignore.

Severe weather affects Ohio's greatest competitive advantages, including fast-moving global supply chains, model climate for corn and soybeans, and access to key waterways like the Mississippi and Missouri Rivers. Severe weather is affecting key industries, from farms and orchards to aerospace, auto suppliers, railroads, restaurants, and shipping.

Business Forward has worked with more than 4,700 entrepreneurs, executives, and small business owners across Ohio. 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 1,380 of them have participated in our climate change and clean energy program, where they have learned about renewable energy options and shared their experience managing severe weather costs.

**20 OF OHIO'S 24
FORTUNE 500
COMPANIES
HAVE ISSUED WARNINGS TO
THEIR INVESTORS, AS WELL
AS INDUSTRY LEADERS IN
ENERGY, MANUFACTURING, AND
FOOD PROCESSING.**

KEY THEMES FROM FORTUNE 500 WARNINGS ABOUT CLIMATE CHANGE

“JUST IN TIME” INVENTORY AND GLOBAL SUPPLY CHAINS RAISE RISK

To boost profits, U.S. companies source from across the globe, encourage suppliers to specialize, and reduce overhead costs by operating with as little as two to four hours of parts inventory on site.

As our supply chains grow more global, more specialized, and faster, severe weather events become more expensive.

EXTREME TEMPERATURES THREATEN COMPARATIVE ADVANTAGES ACROSS SUPPLY CHAINS

Ohio’s 2019 corn and soybean yields were down significantly due to extreme precipitation patterns.

Farmers were forced to plant crops later, throwing off their yearly schedule.¹ Shipping activity on Lake Erie and the Ohio River face unpredictable water levels.

DAMAGE TO THE DEVELOPING WORLD HURTS U.S. COMPANIES

Developing markets face greater climate risk: their populations live in hotter climates and are concentrated in coastal areas with poor infrastructure.

This hurts Fortune 500 companies, because those developing markets are expected to drive their future growth.²

WEATHER CAN BE THE DIFFERENCE BETWEEN A GOOD YEAR AND GOING OUT OF BUSINESS

For retailers, restaurants, and the entertainment industry, weather can make or break their year.

Good weather allows golf courses to sell more afternoon rounds and restaurants and sports teams to fill outdoor seating. For low-margin businesses, marginal sales are critical to survival.

SMALL BUSINESSES ARE LESS LIKELY TO SURVIVE SEVERE WEATHER LOSSES

They have smaller cash reserves, are more likely to operate out of a single location, less likely to have backup systems, and have a harder time relocating.

Small businesses are more likely to shut down due to severe weather events, and their failures are bad news for the big companies they supply.

CLIMATE CHANGE HITS OHIO WHERE IT HURTS - INFRASTRUCTURE

Ohio's infrastructure is particularly vulnerable to severe weather events. According to the American Society of Civil Engineers (ASCE), **1,653** bridges are structurally deficient and **17** percent of roads are in poor condition, costing the average driver **\$544** in operating and maintenance each year. Ohio has **412** dams at high-hazard potential and **\$13.41 billion** of estimated drinking water infrastructure needs over the next 20 years.³

The Federal Government has been underfunding infrastructure for years, resulting in a system that fails: the ASCE gave the United States a **D+** on infrastructure in 2017.⁴ Without a strong federal partner, local and state governments are left to themselves to plan and fund infrastructure investments on their own. Ohio has **3,842** total governmental units, which ranks **fifth** in the country and means planning and coordination are more difficult.⁵

Ohio is within a day's drive of **60 percent** of the U.S. and Canadian population.⁶ It has the **fourth** largest interstate system,⁷ **second** largest inventory of bridges,⁸ **third** highest freight volume,⁹ and **sixth** highest number of vehicle miles traveled.¹⁰ Ohio's infrastructure is among the most used in the country, making it particularly susceptible to extreme weather events.

Because of these factors, Ohio companies are warning investors that climate change threatens to reduce productivity and profits.

1,653
STRUCTURALLY DEFICIENT BRIDGES

412
DAMS AT HIGH-HAZARD POTENTIAL

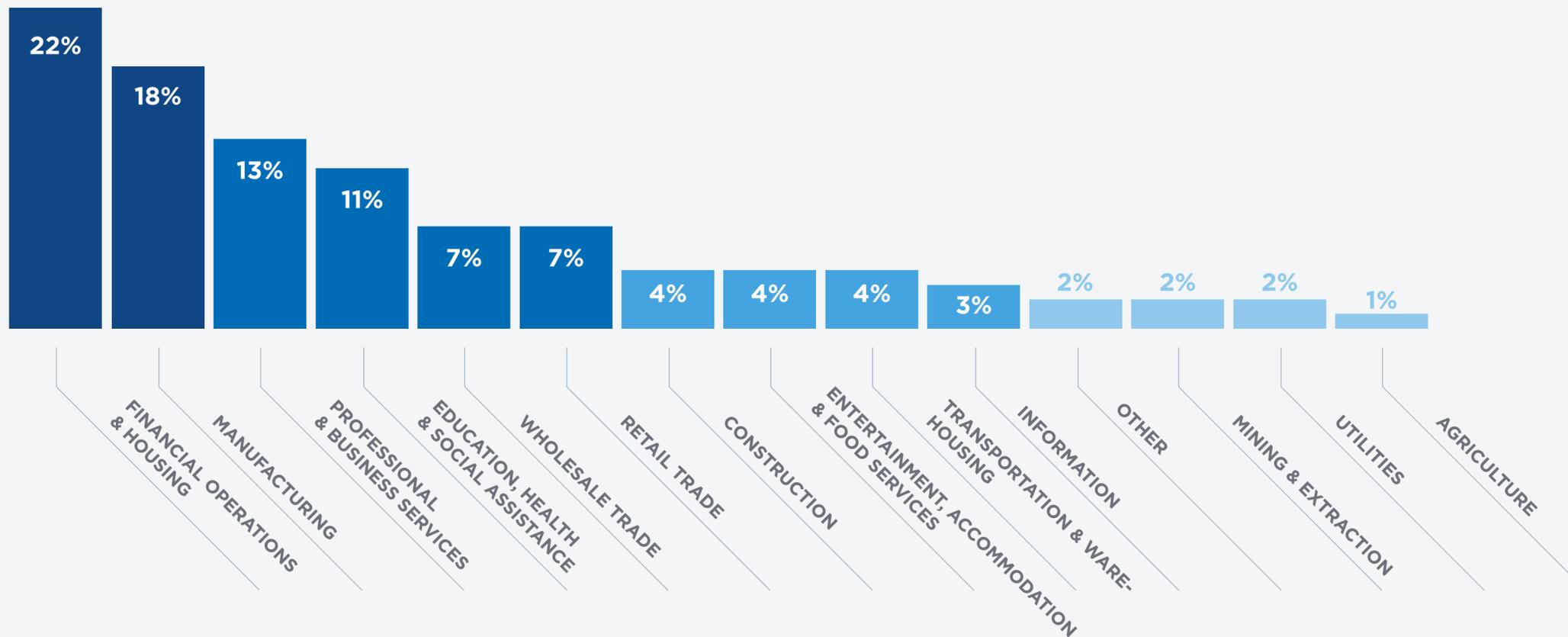
17%
OF ROADS ARE IN POOR CONDITION

\$13.41B
IN DRINKING WATER INFRASTRUCTURE NEEDS OVER THE NEXT 20 YEARS

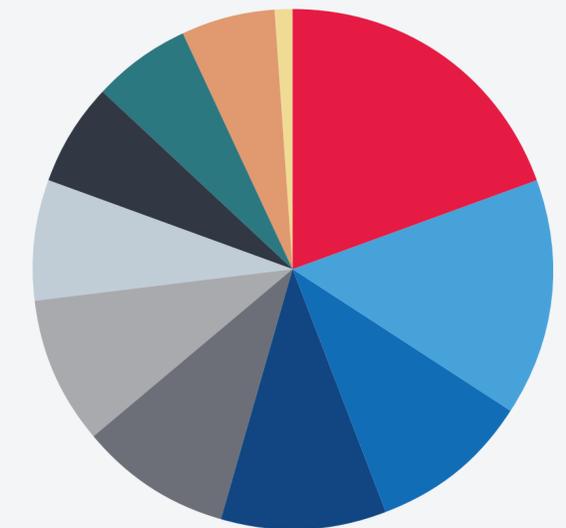
A SNAPSHOT OF OHIO'S ECONOMY



GROSS DOMESTIC PRODUCT BY INDUSTRY (2018)



EMPLOYMENT BY INDUSTRY (2018)



- 20% - OFFICE MANAGEMENT & SUPPORT
- 15% - FINANCIAL OPERATIONS & SALES
- 10% - HEALTH CARE
- 10% - CONSTRUCTION & MAINTENANCE
- 9% - FOOD SERVICES & AGRICULTURE
- 9% - MANUFACTURING
- 8% - TRANSPORTATION & SHIPPING
- 6% - PERSONAL & PROTECTIVE SERVICES
- 6% - EDUCATION
- 6% - SKILL INTENSIVE
- 1% - ENTERTAINMENT

SOURCE: GDP DATA IS FROM THE BUREAU OF ECONOMIC ANALYSIS. EMPLOYMENT DATA IS FROM THE BUREAU OF LABOR. POPULATION FROM THE CENSUS BUREAU. ENERGY DATA FROM EIA.

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

AEROSPACE

There are more than 540 aerospace and aviation companies operating in Ohio, employing more than 38,000 people.¹¹ Ohio is the top supplier to **Boeing** and **Airbus** and invests \$12 billion in research and development in aerospace every year.

Boeing warns investors, “Business disruptions could seriously affect our future sales and financial condition or increase our costs and expenses.” The airlines reports that “damaging weather... could affect our internal operations or our ability to deliver products and services to our customers.”¹²

Collins Aerospace, a subsidiary of United Technologies Systems, has a location in Troy and its parent company reports, “Climate-related events also could disrupt our businesses and require us to incur additional costs.”¹³ United Technologies emphasizes the potential impact of weather conditions, which could damage infrastructure and disrupt supply chains.¹⁴

Lockheed Martin is another major aerospace manufacturer that has warned investors about climate change: “we are limited in the amount of insurance we can obtain to cover certain natural hazards such as earthquakes, fires or extreme weather conditions. We have significant operations in geographic areas prone to these risks.”¹⁵

AIRPORTS

Ohio, the “Birthplace of Aviation,” has international airports in Cleveland, Columbus, and Dayton. Major airlines flying through Ohio’s airports include **Delta**, **American**, and **Southwest**.¹⁶

American Airlines reports that its operations and financial condition are vulnerable to factors out of its control, such as “weather and natural disasters, including increases in such disasters and related costs caused by more severe weather due to climate change.”¹⁷ **United Airlines** similarly warns, “We may incur substantial costs as a result of changes in weather patterns due to climate change.”¹⁸



**OHIO HAS HAD
15 BILLION-DOLLAR
WEATHER & CLIMATE
DISASTERS SINCE 2014¹⁹**

Twenty-four Fortune 500 companies are headquartered in Ohio, 20 of which have issued warnings about severe weather risks.

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

Many also report that increasingly severe weather is affecting their global operations. As Ohio businesses grow, their severe weather risks grow too.

Southwest Airlines warns, “adverse weather and natural disasters such as hurricanes and earthquakes in third quarter 2017... resulted in approximately \$100 million in reduced revenues for the company as a result of approximately 5,000 canceled flights.”²⁰ In the third quarter of 2018, Southwest had to cancel another 2,200 flights because of extreme weather.²¹

Delta Airlines reports, “Severe weather conditions and natural disasters (or other environmental events) can significantly disrupt service and create air traffic control problems. These events decrease revenue and can also increase costs.” The airline cautions investors about “increases in the frequency... [of] severe weather events, including from changes in the global climate.”²²

Smaller airlines are even more susceptible to the effects of climate change. **Frontier Airlines**, which has significant operations in Cleveland and Cincinnati, warns investors: “Cancellations or delays due to adverse weather conditions or natural disasters... may affect us to a greater degree than other, larger airlines.”²³

AUTOMOTIVE MANUFACTURING

Ohio’s automotive industry employs more than 108,000 people. Because of the state’s location, companies in Ohio can reach 72 percent of auto assembly plants in North America within a day’s drive.²⁴ In 2016, the auto industry added more than \$16.9 billion to Ohio’s economy.²⁵

Dana Incorporated is a Fortune 500 company focused on providing products and services for vehicle and engine manufacturers. Based in Maumee, Dana warns investors, “there is no assurance that adverse financial conditions, including... natural disasters or other problems experienced by our suppliers will not result in shortages or delays in their supply of components for us or even in the financial collapse of one or more such suppliers.”²⁶

Ford has warned investors that due to the growing interconnectedness of global markets, natural disasters and other significant events “can have an immediate and material adverse impact on markets around the world.”²⁷ In 2014, Ford warned that “about 25 percent of our operations are located in regions that are now or will be considered to be at risk for water scarcity by 2025,” due to global climate change.²⁸



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.

General Motors explains, “our use of ‘just-in-time’ manufacturing processes allows us to maintain minimal inventory.” However, maintaining low levels of inventory makes General Motors more vulnerable to production disruptions: “Any disruption of our production schedule caused by an unexpected shortage of systems, components, raw materials or parts even for a relatively short period of time could cause us to alter production schedules or suspend production entirely.”²⁹

Honda, which first established its American home in Ohio,³⁰ warns that natural disasters can delay or suspend operations, which consequently harms business and operating results.³¹

The Toledo Complex is an assembly plant in Toledo owned by **Fiat Chrysler**, which warns investors about its supply chain: “Supply of raw materials, parts and components may also be disrupted or interrupted by natural disasters.” It adds, extreme weather events “may have severe and unpredictable effects on the price and availability of certain raw materials in the future.”³²

ArcelorMittal’s largest location is in Cleveland, where productivity nearly doubles the industry average for steel manufacturing.³³ ArcelorMittal reports, “Natural disasters or severe weather conditions could damage ArcelorMittal’s production facilities or adversely affect its operations,” specifically warning of “production disruptions or difficulties associated with mining in extreme weather conditions.”³⁴

AGRICULTURE & FOOD PROCESSING

The total food and agriculture sector employs one in eight Ohioans and contributes more than \$124 billion per year to the economy.³⁵ The state’s top two crops are soybean and corn, which contribute a combined \$4.8 billion in annual value.³⁶ It is predicted that for every degree Celsius (1.8 degrees Fahrenheit), that the Earth warms, corn yields will go down an average of 7.4 percent.³⁷ The cost of dairy products will rise with corn prices because corn is a major feedstock for the dairy industry: as a result, the demand for milk will decrease. Ohio ranks 10th nationally in milk production.³⁸

Ohio has more than 10,000 food processing facilities and ranks second nationally in the production of specialty foods.³⁹

“

Natural disasters or severe weather conditions could damage ArcelorMittal’s production facilities or adversely affect its operations.

”

- ARCELORMITTAL

“

As a specialty coffee roaster, climate change is adversely affecting the long-term outlook for coffee, placing additional burdens on small business here at home and putting small farmers in potential financial peril in all the major growing regions worldwide.

”

- KELLY WICKS
OWNER,
GROUNDS FOR THOUGHT

G&J Pepsi-Cola Bottlers is headquartered in Cincinnati and employs more than 1,600 people across 13 locations in Ohio and Kentucky, making G&J Pepsi the biggest family-owned Pepsi bottler.⁴⁰ **PepsiCo** has warned that “weather conditions (including any potential effects of climate change)” could disrupt supply chains or cause shortages in resources.⁴¹

General Mills has locations in Wellston and Cincinnati and warns investors, “Damage or disruption to raw material supplies or our manufacturing or distribution capabilities due to weather, including any potential effects of climate change... could impair our ability to manufacture or sell our products.”⁴²

Kroger and **J.M. Smucker** are two Fortune 500 food manufacturers based in Ohio. Kroger, headquartered in Cincinnati, warns its investors how “significant inclement weather systems, particularly winter storms, tend to affect our sales trends.” It adds, “Weather conditions and natural disasters could disrupt our operations at one or more of our facilities, interrupt the delivery of products to our stores, [and] substantially increase the cost of products... [which] could materially affect our financial condition, results of operations, or cash flows.”⁴³

J.M. Smucker is headquartered in Orrville and also warns investors about the threat of severe weather: “We may be subject to decreased availability or less favorable pricing for certain commodities that are necessary for our products... extreme weather conditions may disrupt the productivity of our facilities or the operation of our supply chain.”⁴⁴

Archer Daniels Midland has procurement facilities and processing plants in Ohio. The food processing company warns investors, “The availability and prices of agricultural commodities are subject to wide fluctuations, including impacts from factors outside the Company’s control such as changes in weather and climate...”⁴⁵

Ohio is home to a growing number of craft breweries, many of which are impacted by climate change. According to Vincent Valentino at the **Land-Grant Brewing Company** in Columbus, “Almost all U.S. hop production happens in the Pacific Northwest, a region with a historically mild and rainy climate. This year wildfires have sprung up throughout the PNW, which is almost unprecedented. If the strains of demand and poor climate continue to grow in severity, we might see smaller craft breweries struggle to find raw ingredients.”⁴⁶ Valentino’s experience illustrates how geographically concentrated operations can increase a company’s vulnerability.

“**Damage or disruption to raw material supplies or our manufacturing or distribution capabilities due to weather, including any potential effects of climate change... could impair our ability to manufacture or sell our products.**”

- GENERAL MILLS

“**While we know that no single weather event can be directly tied to climate change, we also know that snow in Florida, floods in the Carolinas and unprecedented fires in California are all small indicia of a warming climate that impacts nearly every aspect of our business—from farming to cow pastures, from logistics to customer travel patterns.**”

- JOHN LOWE
CEO,
JENI’S SPLENDID ICE CREAMS

CHEMICALS

The chemical industry in Ohio directly employs more than 40,000 people and on average, pays 39 percent more than a standard manufacturing wage.⁴⁷

Scott's Miracle-Gro Company, founded and headquartered in Marysville, warns investors, "Climate change and unfavorable weather conditions could adversely impact financial results." Scott's Miracle-Gro specializes in products for gardening and lawn care, and emphasizes the possible effects of "changes in rainfall patterns, water shortages, changing storm patterns and intensities, and changing temperature levels that could adversely impact our costs and business operations and the supply and demand for our fertilizer, garden soils and pesticide products."⁴⁸

Based in Columbus, **Hexion** creates chemical products for use across industries. It warns that production facilities are subject to a range of hazards, including "inclement weather and natural disasters," adding that, "production interruption may also result from severe weather, particularly with respect to our southern U.S. operations near the Gulf Coast... such events could negatively affect our operations."⁴⁹

FINANCIAL SERVICES & INSURANCE

Ohio is the sixth largest financial services industry in the country and ranks third in top 50 bank headquarters. It ranks fourth in top 50 insurance headquarters. Fortune 500 financial and insurance companies based in Ohio include **American Financial Group**, **KeyCorp**, and **Progressive**.⁵⁰

American Financial Group is based in Cincinnati and warns investors, "extreme weather events that are linked to rising temperatures, changing global weather patterns and fluctuating rain, snow and sea levels could result in increased occurrence and severity of catastrophes." It explains the unpredictability associated with climate change: "Weather conditions, including too much moisture (flooding or excessive rain) or not enough moisture (droughts), and the level of crop prices in the commodities market heavily impact AFG's crop insurance business. These factors are inherently unpredictable and could result in significant volatility in the results of the crop insurance business from one year to the next."⁵¹

EFFICIENCY & CLIMATE RISK

For decades, Ohio companies have built increasingly large, complex, and fast-moving supply chains. To reach the lowest-cost producers, Ohio companies depend more on Asian, South American, and African markets.

To maximize each individual supplier plant's efficiency, Ohio companies have encouraged their suppliers to specialize. And, to reduce overhead costs, more Ohio companies are following just-in-time inventory practices, which require their global supply chains to operate with greater speed.

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

KeyCorp, headquartered in Cleveland, warns that “Natural disasters, including severe weather events of increasing strength and frequency due to climate change... could have a significant impact on our ability to conduct business or upon third parties who perform operational services for us. Such events could affect the stability of our deposit base, impair the ability of borrowers to repay outstanding loans,” and bring about other unexpected costs.⁵²

Based in Cincinnati, **Cintas** warns investors of unexpected events that could negatively impact operations, including severe weather conditions, fires, natural disasters, supply disruptions, and failure of equipment. Such events could “result in customer disruption, physical damage to one or more key operating facilities, the temporary closure of one or more key operating facilities or the temporary disruption of information systems.”⁵³

Also based in Cincinnati, **Fifth Third Bancorp** similarly warns, “Weather-related events or other natural disasters may have an effect on the performance of Fifth Third’s loan portfolios, especially in its coastal markets, thereby adversely impacting its results of operations.” Fifth Third warns that unpredictable and severe weather events can “significantly impact its loan portfolios by damaging properties pledged as collateral as well as impairing its borrowers’ ability to repay their loans.”⁵⁴

Headquartered in Mayfield, **The Progressive Corporation** reports that in 2018, “unfortunately, our retained catastrophe losses and loss adjustment expenses from hurricanes, hail, winter storms, and the California wildfires totaled \$295 million.” Progressive emphasizes that increasing average temperatures, as a result of global climate change, “may increase how often severe weather events and other natural disasters occur.”⁵⁵

The Cincinnati Financial Corporation is based in Fairfield and owns **The Cincinnati Insurance Company**, among other subsidiaries. Cincinnati Financial warns investors about “climate change risk and its potential financial effects on our results of operation and on those we insure.” It emphasizes the unpredictability of “the impact that changing climate conditions may have on our results of operations...” and explains that in 2018 the company experienced “a \$7 million unfavorable effect from a higher amount of natural catastrophe losses, mostly caused by severe weather.”⁵⁶

“

Such [severe weather] events could affect the stability of our deposit base, impair the ability of borrowers to repay outstanding loans.

”

- KEYCORP

“

Weather-related events or other natural disasters may have an effect on the performance of Fifth Third’s loan portfolios, especially in its coastal markets, thereby adversely impacting its results of operations

”

- FIFTH THIRD BANCORP

HOTELS

Hilton operates 187 hotels in Ohio⁵⁷ and warns investors, “factors beyond our control can reduce demand for hospitality products and services, including demand for rooms at our hotels... [such as] climate change or availability of natural resources, natural or man-made disasters and extreme weather conditions.”⁵⁸

Marriott International also owns hotels across the state, including **Starwood**, **Sheraton**, and **Westin** hotels.⁵⁹ Marriott warns of property damages due to catastrophes “such as earthquakes, hurricanes and floods... For example, in 2018 substantial increases in property insurance costs occurred due to the severe and widespread damage caused by the 2017 Atlantic hurricane season and other natural disasters.”⁶⁰

Hyatt owns 13 hotels in Ohio⁶¹ and reports, “climate change and resource scarcity, such as water and energy scarcity” can adversely affect consumer demand for hotel rooms.⁶²

Choice Hotels International owns **Ascend**, **Comfort Inn**, and **Quality Inn**, among other subsidiaries. Choice operates hotels across Ohio and warns that severe weather is an unpredictable external factor that will negatively impact business and operations.⁶³

MANUFACTURING

The manufacturing sector employs 700,000 Ohioans and accounts for more than \$50 billion in exports. Fortune 500 companies headquartered in Ohio and operating in manufacturing include **Goodyear**, **AK Steel**, and **Owens-Illinois**.⁶⁴

Goodyear Tire & Rubber is based in Akron and warns its investors, “We may be impacted by economic and supply disruptions associated with events beyond our control, such as... natural disasters.”⁶⁵

Based in Cleveland, **Sherwin-Williams** is a Fortune 500 paint and coating manufacturer that warns investors, “adverse weather conditions, including hurricanes, and other natural disasters can disrupt raw material and fuel supplies and increase our costs,” which negatively affects operations because “unexpected shortages and increases in the cost of raw materials and energy... may have an adverse effect on our earnings or cash flow.”⁶⁶

“

Climate change, to the extent it causes changes in weather patterns, could have effects on Allied’s business by increasing the cost of property insurance, and/or energy at the properties.

”

- ALLIED INSURANCE

“

Adverse weather conditions, including hurricanes, and other natural disasters can disrupt raw material and fuel supplies and increase our costs.

”

- SHERWIN-WILLIAMS

Headquartered in West Chester, **AK Steel** reports, “we may experience supply chain disruptions or increased costs from transportation-related challenges,” adding that “natural or man-made disasters, other adverse weather events, or other unforeseen events, could reduce production or increase costs at one or more of our plants and potentially adversely affect customers or markets to which we sell our products.”⁶⁷

Owens-Illinois, based in Perrysburg, manufactures glass products and warns, “For certain raw materials, however, there may be temporary shortages due to weather or other factors, including disruptions in supply caused by transportation or production delays. These shortages, as well as material volatility in the cost of any of the principal raw materials that the Company uses, may have a material adverse effect on operations.”⁶⁸

Owens Corning is another Fortune 500 company with headquarters in Ohio. Founded and based in Toledo, Owens Corning operates in 33 countries and employs 20,000 people. Focused on composites, insulation, and roofing, the manufacturer warns, “Weather conditions and the level of severe storms can have a significant impact on the markets for residential and commercial construction, repair and improvement, which can... adversely impact demand for our products.” It adds that “severely low temperatures may lead to significant and immediate spikes in costs of natural gas, electricity and other commodities that could negatively affect our results of operation.”⁶⁹

A major wood supplier in the Midwest, **Universal Forest Products** has locations in Blanchester, Dayton, Lodi, and Hamilton. It warns, “short-term sales volume, productivity and gross profits can be negatively affected by adverse weather conditions, particularly in our first and fourth quarters.” Universal Forest Products includes “weather conditions” among factors that contribute to “significant fluctuations in the cost of commodity lumber products from primary producers.”⁷⁰

Worthington Industries is headquartered in Columbus and manufactures diversified metals. Worthington warns that extreme weather is among factors that could disrupt operations: “The costs of manufacturing our products and our ability to meet our customers’ demands could be negatively impacted if we experience interruptions in deliveries of needed raw materials or supplies.”⁷¹

Operating in more than 40 countries and based in Delaware, **Greif** creates industrial packaging products. It warns investors that climate change and adverse weather threaten to disrupt the supply chain: “Climate change creates physical and financial risk. Physical risks from climate change include an increase in sea level and changes in weather conditions, such as an increase in precipitation, droughts and extreme weather events.”⁷²

“
Natural or man-made disasters, other adverse weather events, or other unforeseen events, could reduce production or increase costs at one or more of our plants and potentially adversely affect customers or markets to which we sell our products.
”

- AK STEEL

“
Climate change creates physical and financial risk.
”

- GREIF

MILITARY

The **Wright-Patterson Air Force Base** is located northeast of Dayton. With more than 30,000 employees, the base serves as the state's largest single site employer and contributes an annual economic impact of more than \$4 billion.⁷³

In January 2019 the **Pentagon** released a report examining how climate change affects our national defense: "The effects of a changing climate are a national security issue with potential impacts to Department of Defense missions, operational plans, and installations." Of the 79 military facilities examined, about two-thirds are vulnerable to "current or future recurrent flooding" and more than one-half to "current or future drought." In 20 years, seven more locations are expected to become vulnerable to flooding, five to drought, and seven to wildfires.⁷⁴

PHARMACEUTICALS

Among Ohio's Fortune 500 companies, **Cardinal Health** is headquartered in Dublin and warns investors, "supplier relationships could be interrupted or become less favorable due to events beyond our control, including natural disasters..." and infrastructure could be "damaged or fail, whether due to physical disruptions, such as fire, natural disaster, pandemic or power outage..."⁷⁵

PORTS & SHIPPING

Ohio has access to more than 700 navigable miles of waterways; Lake Erie and the Ohio River are both major contributors.⁷⁶ In Cleveland alone, the maritime transportation industry supports more than 20,000 jobs and adds more than \$3.5 billion in annual value.⁷⁷

TravelCenters of America is a Fortune 500 company based in Westlake. Climate change and extreme weather events are a major threat to the shipping industry: "We or franchisees of our travel centers may incur significant costs and losses as a result of severe weather, both in terms of operating, preparing and repairing our travel centers in anticipation of, during and after a severe weather event and in terms of lost business due to the interruption in operating our travel centers or decreased truck movements."⁷⁸

“

Supplier relationships could be interrupted or become less favorable due to events beyond our control, including natural disasters...

”

- CARDINAL HEALTH

“

We or franchisees of our travel centers may incur significant costs and losses as a result of severe weather...

”

- TRAVELCENTERS

Warming temperatures pose a threat to shipping in the Great Lakes. Periods of heavy rain are occurring more frequently and the warmer climate is increasing evaporation; water levels are becoming more unpredictable, making shipping in the Great Lakes less effective and more costly.

Major commercial shipping companies like **UPS** and **FedEx** have warned investors about the risk of climate change and severe weather. UPS reports that severe weather “may result in decreased revenues... or increased costs to operate our business, which could have a material adverse effect on our results of operations.”⁷⁹ FedEx similarly warns, “given the broad and global scope of our operations and our susceptibility to global macroeconomic trends, we are particularly vulnerable to the physical risks of climate change.”⁸⁰

RAIL

There are three class one railroads that operate in Ohio, combining for more than 4,000 miles of operating track: **CSX Transportation**, **Norfolk Southern Corporation**, and **Canadian National**.⁸¹

CSX Transportation runs on nearly 2,000 miles of rail in Ohio and reports that “operations may be affected by external factors such as severe weather... the Company’s rail network may be damaged, its workforce may be unavailable, fuel costs may rise, and significant business interruptions could occur. In addition, the performance of locomotives and railcars could be adversely affected by extreme weather conditions.”⁸²

Norfolk Southern warns that “severe weather could result in significant business interruptions and expenditures. Severe weather conditions and other natural phenomena, including hurricanes, floods, fires, and earthquakes, may cause significant business interruptions and result in increased costs, increased liabilities, and decreased revenues.”⁸³

Canadian National recognizes that climate change creates “risk exposure to extreme weather events, including flooding, heat and cold extremes, cyclones and tornadoes.” It adds, “we assess extreme heat risks on thermal rail expansions that result in rail misalignment and track buckling, as well as extreme cold risks that could result in track freezing, leading to greater frequencies of broken rails, frozen switches, and high rates of wheel replacements.” Canadian National also warns of the increasing risk of “flash flooding, which could result in landslides in unstable mountainous regions and mudslides further damaging rail bed support structures...”⁸⁴



SEVERE WEATHER TREND

HIGHER TEMPERATURES

Temperatures across the U.S. are 1.8 degrees warmer, on average, than they were at the beginning of last century, and most of this increase has occurred since 1970. The last five years have been the globe’s warmest on modern record, and 18 of the 19 warmest years have occurred this century.⁸⁵

Ohio has warmed 2.4 degrees Fahrenheit since 1970, and since the 1990s, the state has seen a major increase in the number of extreme precipitation events.⁸⁶

RESTAURANTS

Fast-food chains like **McDonald's**,⁸⁷ **Wendy's**,⁸⁸ **Burger King**,⁸⁹ **Taco Bell**, and **KFC**⁹⁰ operate hundreds of restaurants across Ohio. And all of them have warned investors that severe weather and climate change will adversely impact their supply chains, food pricing, and consumer demand.

Diversified Restaurant Holdings owns **Buffalo Wild Wings**, which opened its first restaurant in Columbus.⁹¹ It warns, “our food, beverage and packaging costs could be significantly affected by increases in the cost of fresh chicken wings, which can result from a number of factors... [such as] drought and other weather phenomena.” In addition, the company reports that “possible shortages or interruptions in the supply of food items and other supplies to our restaurants caused by inclement weather... could adversely affect the availability, quality and cost of items we buy and the operations of our restaurants.”⁹²

Chipotle, the fast-casual Mexican restaurant with 183 Ohio locations,⁹³ tells its investors that “increasing weather volatility or other long-term changes in global weather patterns, including any changes associated with global climate change, could have a significant impact on the price or availability of some of our ingredients.”⁹⁴

Panera Bread Company has 143 locations in Ohio.⁹⁵ It warns that “unforeseen natural events, such as earthquakes, hurricanes, or other adverse weather and climate conditions, could disrupt our operations or those of our franchisees, or suppliers. These events could reduce traffic in our bakery-cafes, make it difficult or impossible for bakery-cafes to receive deliveries of ingredients or other products, and otherwise impede our or our franchisees’ ability to continue business operations.”⁹⁶

RETAIL

Major retail brands based in Ohio include Fortune 500 companies **Procter & Gamble**, **Macy's**, and **L Brands**.

Procter & Gamble is headquartered in Cincinnati and warns investors that “increasing severity or frequency of extreme weather events due to climate change... could interrupt product supply and, if not effectively managed and remedied, have an adverse impact on our business, financial condition or results of operations.”⁹⁷

“

Our food, beverage and packaging costs could be significantly affected by increases in the cost of fresh chicken wings, which can result from a number of factors... [such as] drought and other weather phenomena.

”

- DIVERSIFIED RESTAURANT HOLDINGS

“

Increasing severity or frequency of extreme weather events due to climate change... could interrupt product supply and, if not effectively managed and remedied, have an adverse impact on our business.

”

- PROCTER & GAMBLE

Also headquartered in Cincinnati, **Macy's** warns, "severe weather conditions, natural disasters or other catastrophic events... may result in the loss or unavailability of inventory and/or delays in the delivery of merchandise to our stores and customers." Macy's adds, "extended periods of unseasonably warm temperatures" can reduce demand for certain products, and "extreme weather conditions could result in disruption or delay of production and delivery of materials and products in our supply chain and cause staffing shortages in our stores."⁹⁸

L Brands warns its investors that market disruptions can result from severe weather and natural disasters. "Extreme weather conditions in the areas in which our stores are located, particularly in markets where we have multiple stores, could adversely affect our business," L Brands explains. The concentration of vendor and distribution facilities near its Central Ohio headquarters leaves L Brands vulnerable to supply chain disruptions.⁹⁹

Walmart owns 172 stores and employs nearly 50,000 people in Ohio.¹⁰⁰ The retail giant reports that "the occurrence of one or more natural disasters, such as hurricanes, tropical storms, floods, fires, earthquakes, tsunamis, cyclones, typhoons... whether as a result of climate change or otherwise... in a country in which we operate or in which our suppliers are located could adversely affect our operations and financial performance."¹⁰¹

The Home Depot is another major employer in Ohio, with 90 locations statewide.¹⁰² The retailer cites "weather-related events" and natural disasters as factors that can disrupt its supply chain and halt operations. It also reports, "extreme weather conditions such as excessive precipitation, [and] warm temperatures during the winter season... could render a portion of our inventory incompatible with customer needs."¹⁰³

Many clothing retailers (including **The Gap**,¹⁰⁴ **Nike**,¹⁰⁵ and **American Eagle Outfitters**¹⁰⁶) have warned investors of the negative effect severe weather has on their operations and sales. **Abercrombie & Fitch** is headquartered in New Albany and warns that "extreme weather conditions or changes in climate conditions or weather patterns" could negatively affect their financial performance and operations.¹⁰⁷

TOURISM

From 2010 to 2018, visitor spending in Ohio increased 44 percent; 222 million people visited in 2018, generating \$46 billion in sales and supporting 429,000 jobs.¹¹¹ Climate change and the increasing frequency of extreme weather events threaten Ohio's greatest tourist destinations, like **Cleveland** and **Columbus**.



SEVERE WEATHER TREND

FLOODING

Warmer climate leads to increased moisture in the atmosphere and higher amounts of precipitation. The January-May period of 2019 was the wettest start to a year in recorded American history, and this heavy rainfall (as well as significant winter snowfall across the Midwest) was a primary cause in the historic Midwest flooding in March.¹⁰⁸

The percent of days with very heavy rain in the Midwest has increased by 37% since the late 1950s, increasing the risk of flooding.¹⁰⁹ Precipitation in summer 2019 put communities across Northeast Ohio underwater: multiple towns saw more than 5 inches of rain in 72-hour periods.¹¹⁰

Cleveland welcomed 18.5 million people in 2017. Visitors accounted for \$8.8 billion in economic impact and supported more than 68,000 jobs.¹¹² But located on Lake Erie, **Cleveland** is susceptible to rising sea levels and shoreline erosion due to warmer temperatures. In May 2019, Lake Erie reached record high monthly water levels. Since the late 1950s, the Midwest has seen 37 percent more days with very heavy rain.¹¹³ The warmer, wetter climate in the region is causing flooding that threatens both water quality and availability.

Each year, **Columbus** welcomes 41.1 million visitors who spend \$7 billion and support one in every 12 jobs in Franklin County.¹¹⁴ But declining air quality, more heat waves, and flash flooding are all making the city less attractive. **Columbus** has been warming faster than national and global rates over the last 65 years. Average low temperatures warmed by 3.6 degrees Fahrenheit from 1950 to 2012, and the pattern is expected to continue, warming three to five degrees by mid-century.¹¹⁵

UTILITIES

Ohio is home to three Fortune 500 utility providers: **Marathon Petroleum**, **American Electric Power**, and **FirstEnergy**.

The Illuminating Company, **Ohio Edison**, and **Toledo Edison** are all owned by **FirstEnergy**, headquartered in Akron.¹¹⁶ Across the Midwest and Mid-Atlantic, FirstEnergy serves six million customers.¹¹⁷ It warns that the “physical risks of climate change, such as more frequent or more extreme weather events, changes in temperature and precipitation patterns... could affect some, or all, of our operations...” FirstEnergy adds that “as extreme weather conditions increase system stress, we may incur costs relating to additional system backup or service interruptions, and in some instances, we may be unable to recover such costs.”¹¹⁸

American Electric Power (AEP) is based in Columbus and warns investors, “Climate change creates physical and financial risk. Physical risks from climate change may include an increase in sea level and changes in weather conditions...” and “unusually extreme weather conditions could impact AEP’s results of operations in a manner that would not likely be sustainable.” AEP adds, “To the extent the frequency and intensity of extreme weather events and storms increase, AEP’s cost of providing service will increase, and these costs may not be recoverable.”¹¹⁹

Headquartered in Findlay, **Marathon Petroleum Corporation** similarly reports, “To the extent such severe weather events or other climate conditions increase in frequency and severity, we may be required to modify operations and incur costs that could materially and adversely affect our business, financial condition, results of operations and cash flows.”¹²⁰

“

Unusually extreme weather conditions could impact AEP’s results of operations in a manner that would not likely be sustainable.

”

- AMERICAN ELECTRIC POWER

“

The Cleveland Indians organization is committed to helping preserve the environment by using advanced energy and green options. We understand the responsibility of being environmentally conscious within the walls of Progressive Field and beyond. Using sustainable technologies is not only good for the community, but good for baseball.

”

- JERRY CRABB,
SENIOR DIRECTOR OF BALLPARK OPERATIONS,
CLEVELAND INDIANS¹²¹

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