

ISSUE BRIEF : Q4 2019

PENNSYLVANIA COMPANIES EXPLAIN CLIMATE CHANGE AND SEVERE WEATHER RISK



BUSINESS FORWARD
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 Pennsylvania 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 elected officials answer a simple question about climate change: Can we fix climate change without wrecking our economy?

Pennsylvania'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 Harrisburg and Washington, D.C. should not ignore.

Severe weather affects Pennsylvania's greatest competitive advantages, including fast-moving global supply chains, model climate for corn and soybeans, and ready access to the Great Lakes and Atlantic. Severe weather is affecting key industries, from farms and orchards to retailers, railroads, restaurants, and shipping.

Business Forward has worked with more than 6,000 entrepreneurs, executives, and small business owners across Pennsylvania. 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 1,500 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.

**19 OF PENNSYLVANIA'S
20 FORTUNE 500
COMPANIES
ARE FEATURED IN THIS
REPORT, INCLUDING LEADERS IN
HEALTH CARE, ENERGY, FOOD,
AND MANUFACTURING.**

KEY THEMES FROM FORTUNE 500 WARNINGS ABOUT CLIMATE CHANGE

“JUST IN TIME” EFFICIENCY RAISES CLIMATE RISK

To boost profits, U.S. companies source from across the globe, encourage their suppliers to specialize, and reduce overhead costs with “just in time” inventory.

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

HIGHER TEMPERATURES THREATEN COMPARATIVE ADVANTAGES ACROSS SUPPLY CHAINS

Pennsylvania’s 2018 corn and soybean yields were down due to record-breaking rainfall in Reading, Pittsburgh, and Scranton.¹ Shipping ports in Philadelphia and Erie face unpredictable water levels.²

Elsewhere, Wisconsin dairy and Michigan cherries are hurting. New England’s fishing fleets are struggling to survive.

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 much of their future growth is supposed to come from those developing markets.³

FOR RETAILERS, RESTAURANTS, AND THE ENTERTAINMENT INDUSTRY, WEATHER = DIFFERENCE BETWEEN A GOOD YEAR AND GOING OUT OF BUSINESS

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 a single location, are less likely to have backup systems, and have a harder time relocating.

Small business failures are also bad news for the big companies they supply.

CLIMATE CHANGE HITS PENNSYLVANIA WHERE IT HURTS - INFRASTRUCTURE

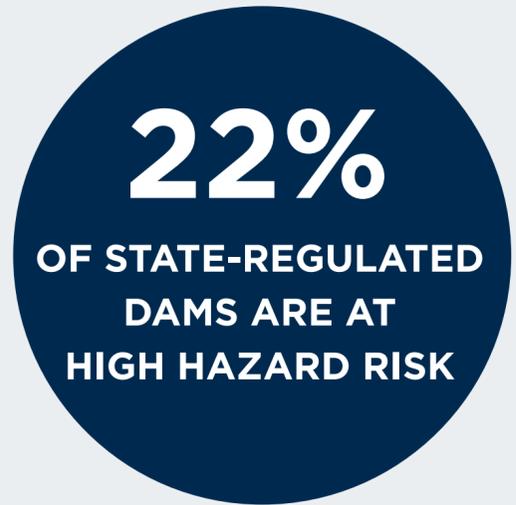
Pennsylvania's infrastructure is particularly vulnerable to severe weather events. According to the American Society of Civil Engineers (ASCE), **22 percent** of dams are at high risk and **30 percent** of the state's public roads are in poor condition, costing the average motorist more than **\$500** in operating and maintenance and contributing to traffic that causes **\$3.7 billion** per year in lost time and wasted fuel.⁴ Each year, billions of gallons of raw sewage discharge into surface waters from the state's current wastewater systems.

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 2017.⁵ According to the Des Moines Register, Pennsylvania has the **seventh worst** infrastructure in the United States; **17 percent** of bridges are at high risk, the **fifth highest** in the U.S.⁶ Without a strong federal partner, local and state governments are left to themselves to plan and fund infrastructure investments on their own. Pennsylvania has **4,897** total governmental units, which ranks **third** in the country and means planning and coordination are more difficult.⁷

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

#7

**WORST
INFRASTRUCTURE
IN THE U.S.**



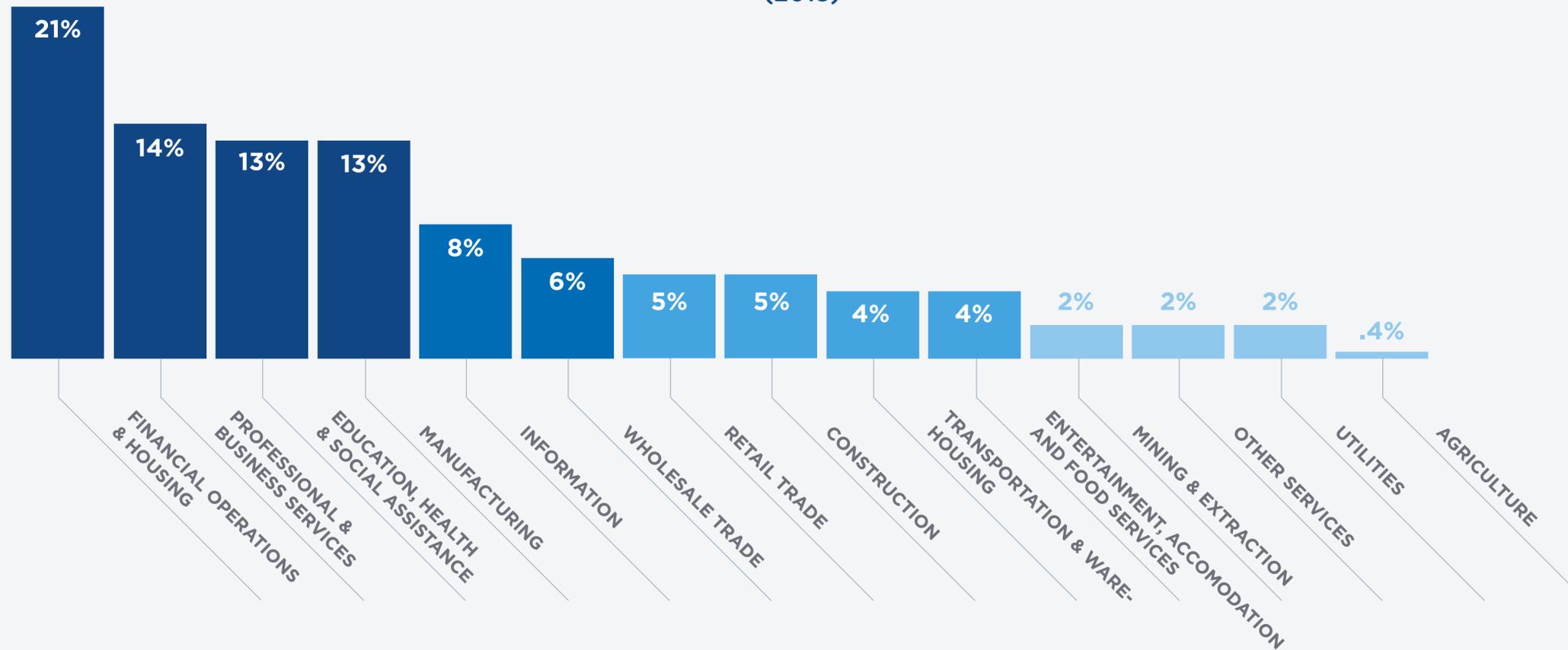
#5 HIGHEST IN U.S.



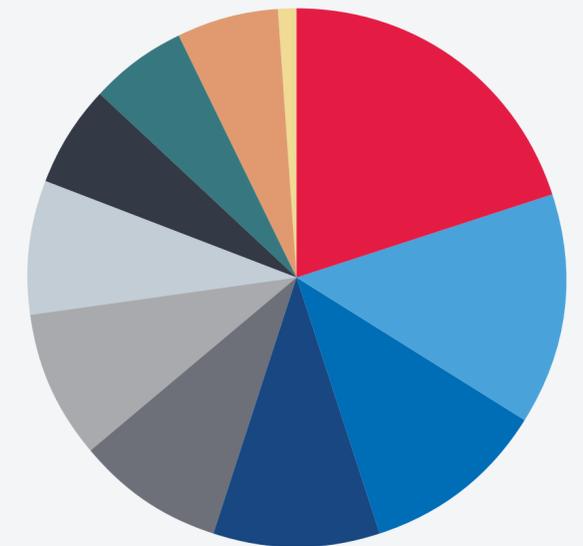
A SNAPSHOT OF PENNSYLVANIA'S ECONOMY



GROSS DOMESTIC PRODUCT BY INDUSTRY (2018)



EMPLOYMENT BY INDUSTRY (2018)



- 20% - OFFICE MANAGEMENT & SUPPORT
- 14% - FINANCIAL OPERATIONS & SALES
- 11% - CONSTRUCTION & MAINTENANCE
- 10% - HEALTH CARE
- 9% - FOOD SERVICES & AGRICULTURE
- 9% - PERSONAL & PROTECTIVE SERVICES
- 8% - TRANSPORTATION & SHIPPING
- 6% - MANUFACTURING
- 6% - SKILL INTENSIVE
- 6% - EDUCATION
- 1% - ENTERTAINMENT

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

HOW SEVERE WEATHER AFFECTS KEY PENNSYLVANIA INDUSTRIES

AIRPORTS

Pennsylvania's two primary airports, located in Philadelphia and Pittsburgh,⁸ serve 40 million passengers each year. Major airlines include **American Airlines** and **United Airlines**.⁹

American Airlines reports that their operations and financial condition are vulnerable to factors out of their control, such as “weather and natural disasters, including increases in such disasters and related costs caused by more severe weather due to climate change.”¹⁰ **United Airlines** similarly warns, “We may incur substantial costs as a result of changes in weather patterns due to climate change.”¹¹

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.”¹² In the third quarter of 2018, **Southwest** had to cancel another 2,200 flights because of extreme weather.¹³

Smaller airlines are even more susceptible to the effects of climate change. **Frontier Airlines** warns investors: “Cancellations or delays due to adverse weather conditions or natural disasters... may affect us to a greater degree than other, larger airlines.”¹⁴

AGRICULTURE AND FOOD PROCESSING

The agricultural sector is essential to Pennsylvania's economy. The Midwest is home to 125 million acres of farmland, where 75 percent is for corn and soybeans; more than 7 million of these acres are in Pennsylvania.¹⁵

Pennsylvania's top four crops are hay, corn, soybeans, and apples. Together they represent \$1.62 billion in economic output and the bulk of Pennsylvania's field crops.¹⁶ 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.¹⁷

Pennsylvania ranks seventh nationally in milk production. 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.¹⁸



PENNSYLVANIA HAS HAD 18 BILLION-DOLLAR WEATHER & CLIMATE DISASTERS SINCE 2014¹⁹

Twenty Fortune 500 companies are headquartered in Pennsylvania, nineteen of which have issued warnings about severe weather.

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

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

Pennsylvania has the most food-processing companies in the country with more than 2,300 statewide.²⁰ The food-processing sector relies on farms to deliver consistent products, which is becoming more difficult for farmers in Pennsylvania due to adverse weather conditions.

Hershey is one of the largest chocolate manufacturers in the world. Headquartered in Derry Township, the company warns that adverse weather causes prices of cocoa products to fluctuate. **Hershey** reports that in 2018, “unfavorable weather conditions during harvest in the key U.S. peanut growing regions resulted in an estimated 26% smaller crop versus the 2017 crop.”²¹

In 2017, **Tyson Foods** invested \$59 million dollars in their Pottsville facility, adding 114 new jobs.²² Recently acquired by **Tyson, Keystone Foods** is a global provider with 25 manufacturing facilities worldwide and headquarters in West Chester. **Keystone** employs 11,000 people and generates \$2.7 billion in annual sales.²³ Parent company **Tyson** warns investors that “climate change could affect our ability to procure needed commodities at costs and in quantities we currently experience and may require us to make additional unplanned capital expenditures.”²⁴

New Holland Agriculture, which operates under parent company **CNH Industrial**, has its North American headquarters in New Holland and operates the largest hay tools production facility in the world. **CNH Industrial** reports that “poor, severe or unusual weather conditions caused by climate change or other factors, particularly during the planting and early growing season, can significantly affect the purchasing decisions of our agricultural equipment customers.”²⁵

Ahold Delhaize, parent company to **Giant Food** (the fifth largest employer in Pennsylvania),²⁶ has warned that severe weather events “could result in physical damage to one or more of our properties, a temporary closure of one or more stores or distribution centers... long-term disruption in the supply of products from some local and overseas suppliers...” and generally “disrupt and adversely affect operations and financial performance.”²⁷

The Kraft Heinz Company is co-headquartered in Pittsburgh. The iconic food company warns investors that global climate change can affect prices of raw materials, agricultural products, and energy.²⁸

“

Climate change could affect our ability to procure needed commodities at costs and quantities we currently experience and may require us to make additional unplanned capital expenditures.

”

- TYSON FOODS

“

Last year was really tough... [The rain] started right out of the gate in the spring, which made it challenging to get your spring forages off, made it challenging to get your corn and your soybeans planted. And it just never stopped.

”

- BETHANY COURSEN,
FARMER, VALLEYWIDE FARM,
CENTRE COUNTY²⁹

Coca-Cola has 14 facilities in Pennsylvania and expresses concerns for how climate change can affect its business.³⁰ It reports that, “climate change may have long-term direct and indirect implications for our business and supply chain.”³¹ Its official statement explains, “the consensus on climate science is increasingly unequivocal – global climate change is happening and man-made greenhouse gas emissions are a crucial factor.”³²

Multinational food manufacturer **Kellogg Company** is building a new 905,000 square foot distribution facility in Lancaster County. The project will cost \$40 million and employ at least 125 people.³³ **Kellogg** warns investors, “the food system and global supply chain is becoming increasingly vulnerable to acute shocks, leading to increased prices and volatility... [which could] unfavorably impact the cost or availability of raw or packaging materials.”³⁴

“ This year, if there’s a storm, we’re out for four to five days because the soil is too wet to get equipment on. ”

- BEN WRIGHT,
OWNER,
HYDROGREEN LLC ³⁵

“ When and if the weather does cooperate, you have the same amount of work but less days to do it in... You could have the most beautiful crop of hay, and you mow it. The weatherman says nice weather for three days, but you know that tomorrow morning, he says it will rain. ”

- AL VETTORI, OWNER,
BUTLER COUNTRY FARM ³⁷

“ As a 27-year-old farm manager of a 13-acre organic farm in Horsham, I have experienced firsthand the challenges brought by this extreme weather. For vegetable farmers in the Northeast, increasingly intense rain in recent years has led to field flooding, crop loss, high weed pressure, and disease spread. ”

- KIRSTIE JONES,
FARM MANAGER,
PENNYPACK FARM ³⁶



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 altering the timing and duration of growing seasons.
3. More severe storms are damaging crops and livestock.

CHEMICALS

Dow Chemical employs 41,300 Pennsylvanians in four facilities statewide.³⁸ The company warns that the threat of severe weather is “significant in scale and could negatively impact operations.” **Dow** is studying the “implications of changing climate parameters on water availability, plant siting issues, and impacts and opportunities for products.” Its supply of raw materials has been significantly disrupted by major hurricanes.³⁹

Air Products & Chemicals warns that “severe weather conditions such as hurricanes, floods, earthquakes, [and] storms... could cause a serious business disruption that could affect our ability to produce and distribute products... additionally, such events could impact our suppliers or customers, which could cause energy and raw materials to be unavailable to us.”⁴⁰

HEALTH CARE AND PHARMACIES

The health care industry employs 10 percent of the state’s workers.⁴¹ Both Fortune 500 companies, **AmerisourceBergen** and **Universal Health Services** are among industry leaders based in Pennsylvania.

AmerisourceBergen is headquartered in Chesterbrook and ranks tenth on the Fortune 500 list.⁴² They report that “extreme weather, natural disasters, power outages or other unexpected events could result in physical damage... long-term disruption in the supply of products, delay in the delivery of products to our distribution centers, and/or disruption of our ability to deliver products to customers.”⁴³

Universal Health Services is Pennsylvania’s sixth largest company.⁴⁴ It warns that “seasonal and severe weather conditions, including the effects of extreme low temperatures, hurricanes and tornadoes” affect their revenues, the demand for health care services, and the profitability of their business.⁴⁵

Both **Rite Aid**,⁴⁶ headquartered in Camp Hill, and **CVS**⁴⁷ (over 500 Pennsylvania locations)⁴⁸ warn that severe weather is among the factors that could disrupt their operations, negatively impact consumer shopping patterns, and adversely affect their financial positions.

EFFICIENCY & CLIMATE RISK

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

To maximize each individual supplier plant’s efficiency, Pennsylvania companies have encouraged their suppliers to specialize. And, to reduce overhead costs, more Pennsylvania 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, Pennsylvania factories, stores, and plants grow more vulnerable to severe weather in other countries.

HOTELS

Choice Hotels International owns **Ascend**, **Comfort Inn**, and **Quality Inn**, among other subsidiaries. **Choice** operates hotels across Pennsylvania and warns that severe weather is an unpredictable external factor that will negatively impact their business and operations.⁴⁹

Marriott International also owns hotels across the state, including **Starwood**, **Sheraton**, and **Westin** hotels. **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.”⁵⁰

Hilton owns more than 100 hotels in Pennsylvania.⁵¹ It warns that “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.”⁵²

INSURANCE

Pennsylvania’s insurance industry supports more than 150,000 jobs and contributes nearly \$30 billion to the annual gross state product.⁵³

A warning from **Erie Insurance Group** emphasizes the added risk insurance companies face: “Changing climate conditions have added to the unpredictability, frequency and severity of natural disasters and have created additional uncertainty as to future trends and exposures.”⁵⁴ **PNC Financial Services** is based in Pittsburgh and reports a similar concern: “Climate change may be increasing the frequency or severity of adverse weather conditions, making the impact from these types of natural disasters on us or our customers worse.”⁵⁵

Lincoln National Corporation, headquartered in Radnor, also warns that “more severe and more frequent natural disasters” due to climate change “could cause a material adverse effect on our results of operations.”⁵⁶

“

We are a towing service and in weather that feels like 115, people are not on the road so we aren’t getting calls. Or our drivers don’t want to work in the temperature hooking up vehicles because it’s dangerously hot. We also run an auto repair shop and the typical shop does not have air so it stalls production.

”

- MIKINA HARRISON
OWNER,
A BOB’S TOWING

“

Extreme weather, natural disasters, power outages or other unexpected events could result in physical damage... long-term disruption in the supply of products, [and] delay in the delivery of products to our distribution centers.

”

- AMERISOURCEBERGEN

Assurant has three offices in Pennsylvania⁵⁷ and warns that “catastrophes can be caused by various natural events, which may be exacerbated by climate change... changes in the global climate may cause long-term increases in the frequency and severity of storms, resulting in higher catastrophe losses, which could have a material adverse effect on our results of operations and financial condition.”⁵⁸

The **Progressive Corporation** reports that “unfortunately, our retained catastrophe losses and loss adjustment expenses from hurricanes, hail, winter storms, and the California wildfires totaled \$295 million.” It also emphasizes that increasing average temperatures, as a result of global climate change, “may increase how often severe weather events and other natural disasters occur.”⁵⁹

MANUFACTURING AND CONSTRUCTION

Pennsylvania’s manufacturing and construction sectors support 17 percent of the state’s jobs⁶⁰; manufacturers alone contribute 13 percent of the GDP.⁶¹ The industry’s leaders headquartered in Pennsylvania include Fortune 500 companies **United States Steel**, **Alcoa**, **PPG Industries**, **Crown Holdings**, and **Toll Brothers**.

Alcoa and **United States Steel** are both headquartered in Pittsburgh. **Alcoa** primarily manufactures aluminum products and experienced both heavy rain and drought conditions over the course of 2017, which disrupted operations and hurt their financial performance.⁶² **U.S. Steel** reports that severe weather conditions have contributed to “problems in obtaining sufficient raw materials and energy in a timely manner.” It also warns of unexpected disruptions in operations because of “power outages, explosions, fires, floods, accidents, [and] severe weather conditions.”⁶³

PPG Industries is “a global supplier of paints, coatings, optical products, and specialty materials.” Both of their primary research centers are in Pennsylvania and are headquartered in Pittsburgh.⁶⁴ **PPG** reports that “natural disasters and severe weather events... could increase the cost of doing business or otherwise harm the operations of PPG, our customers and our suppliers.” It warns that their ability to supply products and access to necessary raw materials may be adversely affected.⁶⁵

“

Changing climate conditions have added to the unpredictability, frequency and severity of natural disasters and have created additional uncertainty as to future trends and exposures.

”

- ERIE INSURANCE GROUP

“

Natural disasters and severe weather events... could reduce our ability to supply products, reduce demand for our products or make it difficult or impossible for us to receive raw materials from suppliers or to deliver products to customers.

”

- PPG INDUSTRIES

Crown Holdings is headquartered in Philadelphia and makes packaging primarily for food and beverage products. It explains that “poor weather conditions that reduce crop yields of packaged foods can decrease customer demand for its food containers.” In 2018, “lower sales unit volumes were primarily the result of lower demand due to challenging weather conditions which resulted in poor harvest yields.”⁶⁶

Toll Brothers is a home construction company headquartered in Horsham. It warns that “adverse weather conditions and natural disasters, such as hurricanes, tornadoes, earthquakes, floods, droughts, and fires, can have serious effects on our ability to develop our residential communities.”⁶⁷

Hexcel has a location in Pottsville that focuses on manufacturing for the commercial aerospace, space and defense, and industrial markets. **Hexcel** estimates the cost of climate change related damages, stating: “Our aggregate environmental related accruals at December 31, 2018 and 2017 were \$2.7 million and \$2.8 million, respectively.”⁶⁸

Lockheed Martin is a major global aerospace manufacturer with locations throughout Pennsylvania. The company expressed concerns by saying, “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.”⁶⁹ In 2014, about 40 percent of their 24,000 key suppliers reported that climate change or water-related risks could negatively impact their supply chains and businesses.⁷⁰

“

Severe weather and our climate crisis are devastating... The hidden costs of the climate crisis undermine economic stability by putting the costs on consumers and homeowners.

”

- LISA LONGO
MANAGEMENT CONSULTANT

“

Poor weather conditions that reduce crop yields of packaged foods can decrease customer demand for its food container... Lower sales unit volumes were primarily the result of lower demand due to challenging weather conditions which resulted in poor harvest yields.

”

- CROWN HOLDINGS



SEVERE WEATHER TREND

MORE SEVERE STORMS

Heavy downpours are increasing nationally. Within the last decade, Pennsylvania’s annual rainfall has increased 5-10 percent.⁷¹

Overly wet springs are bad for farming. Heavy rainfall erodes soil, depletes nutrients, and can cause diseases to spread among crops. In 2018, record-breaking rainfall occurred in Reading, Pittsburgh, and Scranton.⁷²

In March of 2019, the U.S. Department of Agriculture identified 33 counties in PA as primary natural disaster areas. These counties qualify for emergency loans from the government in order to compensate for farming losses.⁷³

MILITARY

Pennsylvania is home to 13 military sites and more than 56,000 active duty service members, reservists, Army and Air National Guard members, and Department of Defense civilian employees. Every year, military and defense operations in the state contribute nearly \$11 billion to the economy.⁷⁴

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.⁷⁵

PORTS AND SHIPPING

Pennsylvania has major ports in three cities: Philadelphia, Pittsburgh, and Erie. The ports support more than 70 million tons of goods, ranking Pennsylvania 10th nationally in volume of goods moved through ports. The Port of Philadelphia is the country’s top port in cocoa beans and forest products and the Port of Pittsburgh is the fourth busiest inland port.⁷⁶

Warming temperatures pose a risk 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. The Great Lakes-St. Lawrence shipping route supports 60,000 jobs and \$3.5 billion of economic activity annually.⁷⁷

UPS is the tenth largest employer in Pennsylvania.⁷⁸ It 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 also warns that “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



SEVERE WEATHER TREND

Tropical storms can increase the risk for floods. In 2011, heavy rains from two tropical storms flooded Swatara Creek near Hershey and Susquehanna in Wilkes-Barre, leading to \$86 million in damages. The Pennsylvania Department of Transportation recently estimated that flooding and landslides caused more than \$105 million in damages to the state in 2018.⁸¹

Sea level rise poses a threat for Pennsylvania’s coastal area along the Delaware Estuary. As temperatures warm and the sea level rises, coastal flooding will become more severe.⁸²

RAIL

Pennsylvania operates 65 railroads, the most in the country, with 5,600 miles of track.⁸³ Three class one railroad operators are in Pennsylvania: **CSX Transportation**, **Canadian National** (which owns Bessemer & Lake Erie Railroad), and **Norfolk Southern Railway**.⁸⁴

CSX 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.”⁸⁵

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.”⁸⁶

Canadian National recognizes that “climate change, including the impact of global warming, has the potential physical risk of increasing the frequency of adverse weather events...” while emphasizing that “severe weather and natural disasters, such as extreme cold or heat, flooding, droughts, fires, hurricanes and earthquakes, can disrupt operations... [resulting] in increased costs, increased liabilities and lower revenues.”⁸⁷

“

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.

”

- CSX TRANSPORTATION

“

Severe weather could result in significant business interruptions and expenditures... increased costs, increased liabilities, and decreased revenues.

”

- NORFOLK SOUTHERN RAILWAY

RESTAURANTS

Fast-food chains like **McDonald's**,⁸⁸ **Wendy's**,⁸⁹ **Burger King**,⁹⁰ **Taco Bell**, and **KFC**⁹¹ operate hundreds of restaurants across Pennsylvania. They all warn investors that severe weather and climate change will adversely impact their supply chains, food pricing, and consumer demand.

Diversified Restaurant Holdings operates 29 **Buffalo Wild Wings** in Pennsylvania.⁹² It warns that “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.”⁹³

Chipotle has 90 locations in Pennsylvania.⁹⁴ The Mexican restaurant chain warns investors: “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. Any increase in the prices of the ingredients most critical to our menu, such as chicken, beef, cheese, avocados, beans, rice, tomatoes and pork, would have a particularly adverse effect on our operating results.”⁹⁵

Panera Bread Company has 105 Locations in Pennsylvania.⁹⁶ 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.”⁹⁷



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.⁹⁸

Pennsylvania has warmed 2.4 degrees since 1970. Harrisburg saw 21 days of rain in May 2019, tying the record for most rainy days in a month.⁹⁹

RETAIL

Walmart owns 161 stores¹⁰⁰ in Pennsylvania and 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 a major employer in Pennsylvania, with 90 locations statewide.¹⁰² The retailer cites “weather-related events” and natural disasters as factors that can disrupt their supply chain and halt operations. It also reports that, “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

Dick’s Sporting Goods is headquartered in Pittsburgh and has 39 locations in Pennsylvania.¹⁰⁴ **Dick’s** warns that consumers’ spending may be affected by the effects of adverse weather conditions: “Poor performance during our fourth quarter, whether because of a slow holiday selling season, unseasonable weather conditions... could have a material adverse effect on our business... additionally, abnormally wet or cold weather in the spring or summer months could reduce our sales.”¹⁰⁵

Many clothing retailers (including **The Gap**,¹⁰⁶ **Nike**,¹⁰⁷ **Abercrombie & Fitch**,¹⁰⁸ and **L Brands**¹⁰⁹) have warned investors about the negative effect severe weather has on their operations and sales. **American Eagle Outfitters** has 54 Pennsylvania locations¹¹⁰ and warns that “extreme weather conditions or changes in climate conditions or weather patterns” could negatively affect their financial performance and operations.¹¹¹

“

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.

”

- **CHIPOTLE**

“

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

”

- **SOUTHWEST AIRLINES**

FOOD PROCESSING

Aramark, headquartered in Philadelphia, is a global provider of food, facilities and uniform services. It reports, “Food prices can fluctuate as a result of permanent or temporary changes in supply, including as a result of incidences of severe weather such as droughts, heavy rains and late freezes or natural disasters.” **Aramark** warns that such price volatility can lead to “increased operating costs and obstacles to cost recovery.”¹¹²

BROADBAND

Comcast, headquartered in Philadelphia, warns that “severe weather events such as hurricanes and wild fires have impacted our services, products and properties from time to time in the past and will in the future... these events may result in large expenditures to repair or replace the damaged properties.”¹¹³

TOURISM

Visitors to Pennsylvania spend \$41 billion per year and support 500,000 jobs.¹¹⁴

The Lehigh Valley, Great Lakes Region, and Philadelphia are among Pennsylvania’s major tourism destinations; all three are susceptible to climate change and increasingly severe weather conditions.

The Lehigh Valley is the fastest warming region in Pennsylvania, where hotter weather is bringing heavier rains and a higher risk of flooding.¹¹⁵ The infrastructure in Pennsylvania is not equipped to handle a rapidly changing climate. Ranked fourth worst in the country, Pennsylvania’s infrastructure includes 30 percent of public roads in poor condition and 797 hazardous dams.¹¹⁶ In 2015, 15.2 million people visited the Lehigh Valley, which supports 24,750 jobs and generates \$5.5 million in economic impact every day.¹¹⁷ Such a dramatic heating trend makes the region particularly susceptible to infrastructure damage.

Erie, Pennsylvania and the Great Lakes Region offer many recreational activities: hiking and biking trails, vineyards, beaches, fishing, and wildlife. But climate change and warmer temperatures can raise sea levels and trigger shoreline erosion and coastal flooding. In May 2019 Lake Erie reached record high monthly water levels.¹¹⁸ Beyond recreation, the Great Lakes are also an essential water supplier for the region; since the late 1950s, the Midwest has seen 27 percent more days with “very heavy rain.”¹¹⁹ The warmer, wetter climate in the region is causing flooding that threatens both the water quality and availability.

Philadelphia’s metro area is home to over six million people¹²⁰ and welcomed 43.3 million visitors in 2017.¹²¹ As of August 2019, Philadelphia had already issued more severe thunderstorm and tornado warnings than it did in all of 2018.¹²² The heightened frequency of severe weather and the increase in rain is directly related to the warming climate: “From 1874 to 1986, temperatures hit or surpassed 90°F at least 40 times in one year only twice. From 1987 to 2017, it happened seven times.” Of the 10 rainiest months on record, six have been since 1994.¹²³

UTILITIES

Exelon Corporation has 18 locations in Pennsylvania, including the PECO headquarters in Philadelphia.¹²⁴ **Exelon** warns its “facilities and operations are subject to the global impacts of climate change and Exelon believes its operations could be significantly affected by the physical risks or climate change.”¹²⁵

PPL Corporation is based in Allentown and provides energy services to more than 10 million people.¹²⁶ It warns that “physical effects of climate change, such as increased frequency and severity of storms, floods, and other climatic events, could disrupt our operations and cause us to incur significant costs to prepare for or respond to these effects.” **PPL** also explains that weather conditions can “significantly affect our profitability or operations by causing outages, damaging infrastructure and requiring significant repair costs. Storm outages and damage often directly decrease revenues and increase expenses.”¹²⁷

UGI Utilities, headquartered in Denver and serves 700,000 customers.¹²⁸ It reports that “our results of operations are adversely affected by warmer-than-normal heating season weather. Weather conditions have a significant impact on the demand for our energy products and services... there can be no assurance that normal winter weather in our market areas will occur in the future.”¹²⁹

FirstEnergy is an electric utility provider with four distribution companies across Pennsylvania (Met-Ed, Penelec, Penn Power, and West Penn Power). Across the Midwest and Mid-Atlantic, **FirstEnergy** serves six million customers.¹³⁰ 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. Severe weather... could result in increased costs, including supply chain costs.”¹³¹

INFRASTRUCTURE CHALLENGES

WASTEWATER SYSTEMS

Current sewer system infrastructure may not be able to handle increased rainfall. Pennsylvania will either have to upgrade their systems or it will have to pay for damages. It is estimated that Pennsylvania will need to spend roughly \$6.95 billion to improve wastewater infrastructure over the next 20 years.¹³²

WATER SUPPLY

Increasing sea-levels could affect the salinity of the Delaware River system, leading to water-supply problems in Philadelphia.¹³³

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