

Major public companies describe climate-related risks and costs

A review of findings from CDP 2011-2013 disclosures

May 2014



A white paper from CDP North America released with the support of Bloomberg Philanthropies

Introduction

Each year, CDP requests climate-change-related disclosures from public companies on behalf of a growing number of institutional investors. In 2014, the request for disclosure was sent on behalf of 767 institutional investors with \$92 trillion in assets. This report presents key findings and responses provided by S&P 500 companies across economic sectors to the risk-related questions in CDP's annual disclosure requests from 2011 to 2013.

Findings show that S&P 500 companies assess physical risks from climate change to be increasing in urgency, with physical disruptions and cost impacts already being felt.

- ▼ **45% of risks were described by companies as current or predicted to fall within the next 1-5 years in 2013, up from 26% in 2011**
- ▼ **50% of the risks disclosed were described as more likely than not to virtually certain in 2013, up from 34% in 2011**
- ▼ **68% of the disclosed physical risks were direct to operations in 2013, up from 51% in 2011**

Excerpts from the disclosures presented below focus on physical risks and attendant costs such as damage to facilities, reduced product demand, lost productivity, and necessitated write-offs. More information on corporate resilience planning and expenditures in light of these risks can be found in the complete disclosures to CDP, available at www.cdp.net.

Table 1: Aggregate physical risks profile disclosed by S&P 500 companies over 3 years

Risk Description	2011	2012	2013
Now or later	26% of physical risks disclosed are current or predicted to be felt in the next 1-5 years.	32% of physical risks disclosed are current or predicted to be felt in the next 1-5 years.	45% of physical risks disclosed are current or predicted to be felt in the next 1-5 years.
Likelihood	34% of physical risks disclosed fall between more likely than not to virtually certain.	40% of physical risks disclosed fall between more likely than not to virtually certain.	50% of physical risks disclosed fall between more likely than not to virtually certain.
Direct or indirect	The majority of disclosed physical risk exposures are direct to operations (51%), and the minority are indirect (8% to clients and 18% to the supply chain).	The majority of disclosed physical risk exposures are direct to operations (56%), and the minority are indirect (8% to clients and 21% to the supply chain).	The majority of disclosed physical risk exposures are direct to operations (68%), and the minority are indirect (9% to clients and 22% to the supply chain).
Top 5 physical risk drivers	1. Change in precipitation extremes and droughts	1. Change in precipitation extremes and droughts	1. Change in precipitation extremes and droughts
	2. Tropical cyclones (hurricanes and typhoons)	2. Tropical cyclones (hurricanes and typhoons)	2. Tropical cyclones (hurricanes and typhoons)
	3. Induced changes in natural resources	3. Induced changes in natural resources	3. Induced changes in natural resources
	4. Uncertainty of physical risks	4. Uncertainty of physical risks	4. Uncertainty of physical risks
	5. Other physical climate drivers	5. Induced changes in natural resources	5. Sea level rise
Top 5 potential impacts of physical risks	1. Increased operational cost	1. Increased operational cost	1. Increased operational cost
	2. Reduction/disruption in production capacity	2. Reduction/disruption in production capacity	2. Reduction/disruption in production capacity
	3. Inability to do business	3. Inability to do business	3. Inability to do business
	4. Reduced demand for goods/services	4. Increased capital cost	4. Reduced demand for goods/services
	5. Increased capital cost	5. Reduced demand for goods/services	5. Increased capital cost

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The image on the front cover of this report is from November 2012 and shows downed utility poles along Bull Run Road in Hopewell Township, NJ three days after Superstorm Sandy.

Note to reader:

Year numbers listed next to company names of each disclosure excerpt relate to the year the disclosure was made to CDP.

Consumer Discretionary

Description of risks and potential financial implications

In 2011, 242 locations (21% of our US Big Box store portfolio) were impacted some by weather related events.

We are self-insured against general liability (including property damage), although we obtain third party insurance coverage to limit our exposure to these claims. We maintain wholly owned insurance captives to manage a portion of these self-insured liabilities. When estimating our self-insured liabilities, we consider a number of factors, including historical claims experience, severity factors and valuations provided by independent third-party actuaries. We do not believe there is a reasonable likelihood that there will be a material change in the estimates or assumptions we use to calculate our self-insured liabilities. However, if actual results are not consistent with our estimates or assumptions, we may be exposed to losses or gains that could be material. A 10% change in our self-insured liabilities at March 3, 2012, would have affected net earnings by approximately \$8 million in fiscal 2012.

Best Buy Co., Inc. (2012)

Changes in precipitation and drought led to lower cotton yields and higher cotton prices. This increase in material costs put pressure on our average unit costs and gross margins. Going forward, potentially worsening drought conditions in China and the U.S. could continue to affect cotton production. In addition, the increased length and severity of extreme precipitation patterns, including worsening snow storms and hurricanes, across much of the U.S. east coast in 2010 impacted our business through decreased consumer buying and lost sales.

Gap Inc. (2011)

We can experience short-term store closures immediately before and after a natural disaster which creates lost sales during that time frame. Those lost sales could equate to approximately \$50,000 - \$100,000 per day for the duration of the time the store is closed. Those lost sales are usually recaptured, and the affected stores traditionally see no net impact in sales as the stricken community rebuilds from the damage. For example, in the Joplin, Missouri tornado in May 2011, we lost the store completely but had a tent erected in days to service the community with repair products.

The Home Depot, Inc. (2012)

Our New Orleans operations and associated personnel were severely impacted by Hurricane Katrina, which resulted in the eventual movement of the operations to higher ground in Louisiana and Texas. The move disrupted a highly profitable operation and ultimately cost the company hundreds of thousands of dollars in lost revenues and costs associated with helping our employees move. Other events such as tornados, flooding, excessive precipitation, ice and more frequent ice and snow storms, etc. have resulted in similar impacts of varying degrees and costs, but in general have negatively impacted our operations and with considerable discussion that climate change was a major influence on these events. Johnson Controls could also be impacted by indirect financial risks passed through the supply chain to us or to our customers as a result of increasing process disruptions due to physical changes. This could result in price changes for our products and the resources needed to produce them. Today we see highly volatile commodity prices for lead, aluminium, copper and other raw materials used in our products. Some spikes have resulted in fluctuating prices, often with highs 2-5 times higher than previous lows. Such volatility often results from real and perceived fears about availability, and lately there are numerous examples where price increases resulted directly from many of the risk drivers discussed above. Such volatility makes forecasting and planning more difficult, especially when deciding on costs for new products, i.e., lithium for hybrid vehicles. We currently use many hedging strategies and pricing arrangements to add stability to commodity prices, but such arrangements add costs, which unfortunately must be ultimately passed on to consumers.

Johnson Controls (2011)



In 2011, a New Hampshire Kohl's store experienced complete devastation from hurricane Irene. [...] This Kohl's store was back up and running, as well as completely remodeled in less than three months to be ready for the Q4 sales period. There are many costs associated with this type of accelerated response.

Kohl's Corporation (2012)



Climate projection models make it difficult to know exactly how business might be impacted by episodic weather events. However, it is clear from past severe weather events that some of News Corporation's businesses are susceptible to such extreme weather. Extreme weather events around the world that cause damage or disruption to power supplies, and that exceed the contingency abilities of backup generators, could impact News Corporation's ability to produce and deliver its content. Severe weather can also pose physical risks to News Corporation's supply chain, including the ability and timeliness with which products and services can be delivered to and from the company. In some cases severe episodic weather events have already impacted News Corporation's business. For example, extreme precipitation in Australia affected the filming schedule of a production in the region. Recent wildfires in Russia disrupted filming there and led to schedule delays and property damage. Since a large portion of News Corporation's entertainment operations are based in Southern California, extended and severe droughts that lead to an increased frequency and intensity of wildfires are a concern, and could impact employees, facilities and productions in the region. Superstorm Sandy in the U.S. reduced box office sales in a key market. Estimates suggest that the 12-25% drop in total U.S. box office sales at the time was due in large part to closed theaters. In addition, one of the company's businesses reported a loss of more than \$1.2M from Sandy. One plant also experienced more than \$1M in damages due to Sandy. The storm also caused News Corporation offices to close and employees to be unable to work.

News Corp (2013)



In 2009 and early 2010, the Fiji Times was subject to multiple cyclones within the same season resulting in disruptions to business operations. The severe weather resulted in a loss of primary grid-supplied power and necessitated a switch to backup diesel generators. Though critical operations were able to remain running, administrative and business functions were disrupted. In addition, large scale damage to infrastructure impacted the ability of employees to get to work and newspapers to be delivered. The declaration of a state of emergency and institution of an official curfew during Cyclone Tomas added to the disruptions to operations. Even after initial services were restored, the long term impacts on the citizens of Fiji and the local economy led to a decrease in consumer discretionary spending that impacted the advertising market in the country.

News Corp (2011)



In 2011, more than \$14,500,000 in reported expenses were incurred due to repairing and replacing buildings and goods that were the direct or indirect result of extreme weather. The Company incurred an additional \$8,700,000 due to flood damages during the year.

Sears Holdings Corporation (2012)



The total portfolio of SHC's inventory and buildings sums in the billions of dollars. In 2010, more than \$9,000,000 in reported expenses were incurred due to repairing and replacing buildings and goods that were the direct or indirect result of extreme weather.

Sears Holdings Corporation (2011)





Change in average temperature can also lead to increased operational costs for Starwood, due to an increase in utility costs. In the International Energy Agency's World Outlook 2013, they have estimated that global demand for space cooling will increase by 170% and 11% for space heating by 2035, using current climate change projections. Based on this information, there are several potential financial implications for Starwood going forward, including an increase in energy usage and the potential for more energy grid failures. Energy grid failures are a higher risk in non-OECD countries, where we are developing a large number of hotels, which could lead to an increase in the need for generators. Assuming an average 7% annual increase in cooling demand until 2035 (and without including future energy efficiency gains and also taking into consideration the varying cooling needs for each hotel across our portfolio), Starwood and its owners potentially could incur an approximate \$10-20 million (\$USD) increase in cooling costs alone, per year (based on the size of our current portfolio). Therefore, it is extremely important for Starwood to continue to pursue energy conservation measures. These are both capital and annual costs.

Starwood Hotels & Resorts Worldwide, Inc. (2013)



In the southeastern U.S., persistent drought conditions in previous years have significantly impacted our hotel operations and led to pool closures. In addition, extreme weather events can lead to local supply shortages causing dramatically increased costs for basics good and hinder transportation of such goods within the affected areas.

Starwood Hotels & Resorts Worldwide, Inc. (2011)



In 2012, we saw an impact to some of our brands due to unusually mild weather that reduced demand for cold-weather boots and jackets.

VF Corporation (2012)



In 2010, flooding in Pakistan and Australia and wet weather and freezes ravaged cotton crops resulting in drastic increases in the price of cotton. These price increases have a material effect on our business as we sought a balance between absorbing the cost and raising prices on our cotton goods. Climate change threatens to increase such occurrences.

VF Corporation (2011)



Consumer Staples

Description of risks and potential financial implications

Changes in temperature extremes could have a direct impact on many Campbell Suppliers. Many of our suppliers are direct agricultural producers, and these types of changes could not only affect yield and costs, but location, transportation and even availability. Campbell suppliers and farming partners monitor and respond to these issues as part of their business. A case could even be made that changes in temperature extremes could affect other natural disasters—having impacts on food for disaster relief—or even consumer preferences for certain types of food found in the Campbell portfolio.

Campbell Soup Company (2013)

Climate change associated water resource constraints. The greatest physical risk from climate change remains in our supply chain, which provides the agricultural ingredients of our products. With approximately 70 percent of water in the United States used for agriculture, any increase in water scarcity resulting from climate change presents a significant physical risk.

ConAgra Foods, Inc. (2013)

We have experienced weather-related sourcing challenges, such as delayed tomato harvesting due to unseasonably cool weather and difficulty sourcing other vegetables due to above normal precipitation.

ConAgra Foods, Inc. (2012)

Unseasonable or unusual weather or long-term climate changes may negatively impact the price or availability of raw materials, energy and fuel, and demand for our products. Unusually cool weather during the summer months may result in reduced demand for our products and have a negative effect on our business and financial performance. [...]

We may be faced with water availability risks. Water is the main ingredient in substantially all of our products. Climate change may cause water scarcity and a deterioration of water quality in areas where we maintain operations. The competition for water among domestic, agricultural and manufacturing users is increasing in the countries where we operate, and as water becomes scarcer or the quality of the water deteriorates, we may incur increased production costs or face manufacturing constraints which could negatively affect our business and financial performance. Even where water is widely available, water purification and waste treatment infrastructure limitations could increase costs or constrain our operations. [...]

We may see increased raw material, commodity, and water costs as a result of weather, climate changes and the availability of water. A portion of our cost of sales, or \$2.5 billion, could be at risk through increased costs to our supply chain as a result of these risks.

Dr Pepper Snapple Group Inc. (2013)

PepsiCo is a consumer-facing company with more than \$65 billion in consumer-driven net revenue in over 200 countries and territories in the world. PepsiCo spends about \$12.0 billion annually, or 18% of revenue, on primarily raw, agriculturally based ingredients. PepsiCo also spends about \$6.9 billion annually, or 10.5% of revenue, on packaging that is closely related to oil, paper, and other raw commodity items. Finally, PepsiCo spends about \$1.0 billion annually, or 1.5% of revenue, on direct and indirect energy purchases. As a result, PepsiCo revenues are sensitive to changes in consumer preference due to elevated temperatures, changes in crop yields due to changes in precipitation and temperature patterns, increases in transportation costs and increased supply chain costs due to changes in crop locations, increased energy cost, increased fiberboard cost or disruptions due to flooding, and our hedging costs can vary drastically due to an increase in perceived risk in the commodity markets.

PepsiCo, Inc. (2013)



In August 2005, Hurricane Katrina caused catastrophic damage to the New Orleans area. Following the hurricane, production at the New Orleans facility was interrupted for approximately two months, resulting in a significant decline in coffee revenues for several months.

The price of green coffee has been subject to significant volatility, with spot prices reaching a new 34-year high in 2011. Further, the market continues to be influenced by a number of factors, including speculative trading but also weather. In addition, in 2011, costs to acquire peanuts increased significantly, in part, due to adverse weather conditions.

The J.M. Smucker Company (2012)



If sea levels rise, devastating effects could result on stores and the communities in coastal or low-lying regions. The example of Hurricane Katrina illustrates the potential effects. As a result of that event, we closed approximately 200 of our stores and clubs for at least some period of time. Out of those 200, we had 110 locations that suffered damage that ranged from moderate to severe. We had at least six stores or clubs that were shut down for more than 3 months. One of those remained closed until 2010 and two have never reopened. Our average daily sales per store in 2005 were just under \$150,000 per day. Had just these six stores remained open, we would have achieved cumulative sales from them to date in excess of \$500 million.

The implications of increased frequency and duration of storms could include supply disruption, customer inconvenience and reduced demand, and disruptions to our own operations. A recent analysis concluded that during the nine year period from 2004 to 2012 Walmart U.S. had filed insurance claims for losses in excess of \$3 million dollars each year due to severe weather induced power outages. The total amount of losses due to weather varied greatly depending on the number and severity of extreme events with an average annual loss of \$20 million.

Wal-Mart Stores, Inc. (2013)



Energy

Description of risks and potential financial implications

There is concern that climate change may increase the frequency or intensity of hurricanes, which could affect our operations. The Gulf of Mexico is of particular importance. During 2012, net daily production for the company's combined interests in the Gulf of Mexico shelf and deep water areas and the onshore fields in the region averaged 153,000 barrels of crude oil (9% of our global production), 395 million cubic feet of natural gas (8% of our global production) and 16,000 barrels of NGLs (22% of our global production). Further, this region houses many of the oil and gas pipelines that move domestic resources from the Outer Continental Shelf to the rest of the country.

The following case study can provide an idea of the financial implications associated with the negative impact of hurricanes on Chevron's facilities: [...] Hurricane Katrina first made landfall on Aug. 29, 2005. Three weeks later, the Gulf Coast suffered a second blow when Hurricane Rita struck. Before the storm, Pascagoula processed 330,000 barrels/day of crude oil and produced 5 million gallons of gasoline. Pascagoula Refinery's perimeter dike protected it from catastrophic damage. Wind was the primary cause of destruction to the complex. Chevron provided the 500,000-sq.ft. camp that held as many as 1,500 people for free. The effects of the storms included a reduction in crude oil and natural gas production and added costs for repairs and maintenance of both offshore and onshore facilities, resulting in an approximate \$1.4 billion negative impact in the second half of the year. Therefore, a similar event could cause a similar magnitude of financial impact.

Chevron Corporation (2013)


Climate change can have adverse impacts on insurance affordability and availability, potentially slowing the growth of the industry and shifting more of the burden to governments and individuals. Insurers have recently started to factor in climate change in their insurance cost calculations.

Chevron CEO O'Reilly stated (31 Jan 2006): "Because we are the largest oil and gas producer in the Gulf of Mexico shelf, our profits were disproportionately affected by the impact of the hurricanes. The effects of the storms included a reduction in crude oil and natural gas production and added costs for repairs and maintenance of both offshore and onshore facilities, resulting in an approximate \$1.4 billion negative impact in the second half of the year."

Chevron Corporation (2011)

Because each facility is unique and weather-related events vary widely in frequency and intensity, the cost to reduce potential physical climate change risk will vary greatly. To illustrate a high-side cost, a Category 5 Hurricane (Katrina) landed on the U.S. Gulf Coast in 2005 and impacted upstream and downstream energy industry operations. It reduced upstream oil and gas production by 1.5 MM barrels per day and eight billion cubic feet per day, respectively, for an extended period of time. Additionally, 22.8 billion cubic feet per day of gas processing capacity along the US Gulf Coast was also curtailed for a protracted period of time. A post-storm assessment of the impact prepared by Cambridge Systematics placed the public and private cost of the storm at \$ 75 Billion.


ConocoPhillips (2012)



Aggregate plant, property, and equipment damages from Superstorm Sandy to the Port Reading refining facility and the Hess terminal network and retail sites were approximately \$20 million. We could expect to see similar damages from future storms.


An increase in the number and severity of extreme weather events due to climate change could result in damage to Hess assets located in coastal zones, offshore, or in inland areas vulnerable to tornados or flooding. The Property, Plant, and Equipment (PPE) values of assets in areas prone to hurricanes or other extreme weather events is about \$8 billion. Severe weather events can also cause disruptions in exploration, and production, operations, which can lead to reduced revenue.

Hess Corporation (2013)




An increase in precipitation can lead to floods, such as last year's record breaking event in North Dakota, impacting Hess and the communities where our employees live. [...] Floods like the one in North Dakota can be a factor in missing production forecasts and may even lead to a lower share price. In addition to donating \$1 million to flood relief in North Dakota, Hess suspended operations for two weeks so employees could help with rescue and clean-up efforts.

Hess Corporation (2012)




In 2008, costs related to Hurricanes Gustav and Ike were limited to \$9 million after income taxes, and production was reduced by an estimated 7,000 barrels of oil equivalent per day (boepd).

Hess Corporation (2011)



Newfield's strategy consists of maintaining a diversified portfolio of core North American assets, with a near-term investment focus on oil and liquids growth. Therefore, changes in mean (average) temperature could have financial implications that affect volatility in the oil and natural gas commodity markets. For example, if crude oil prices decreased 10% from the company's average realized prices during 2012 of \$83.99 per Bbl, Newfield would have lost approximately \$8.40 per Bbl, which at our 2012 production volume of 11,988 MBbls would equal approximately a \$100 million reduction in revenues.

Newfield Exploration Co. (2013)




Particularly severe weather can affect platforms or structures, resulting in a suspension of activities until repairs can be implemented. For example, disruption to rig operations caused by flooding of the Rio Grande river in Mexico cost approximately \$3 million.

Schlumberger also faces business interruption exposure when our clients have to close down, delay and sometimes abandon operations during extreme storms. Thus physical risks from climate change include direct damage to Schlumberger personnel and property and indirect loss of revenue caused by cancellations or delays in work following storm damage or evacuation by clients. Offshore rig operations typically cost about \$1 million per day to operate, and any shutdown has a potentially significant financial impact.

Schlumberger may be materially affected by severe weather conditions in tropical areas where the company operates. This may entail the evacuation of personnel and stoppage of services. In addition, particularly severe weather affecting offshore platforms or structures may result in a suspension of activities until the platforms or structures have been repaired. Any of these events could adversely affect our financial condition. The marine vessel WesternGeco Trident, operating off the coast of Australia, was caught in a typhoon that caused \$22 million in damage to seismic streamers, in addition to down time while repairs were made.


Schlumberger Limited (2013)



Particularly severe weather can affect platforms or structures, resulting in a suspension of activities until repairs can be implemented. For example, disruption to rig operations caused by flooding of the Rio Grande river in Mexico cost approximately \$3 million. As well, a base in Mumbai was closed due to flooding, and numerous operations in Australia were affected by flooding in 2010, and seismic operations were damaged and halted by severe windstorms (see below).



We have sustained ice damage to our operations in Russia and in the north of Canada, for example. Apart from such direct losses, Schlumberger also faces business interruption exposure when our clients have to close down, delay and sometimes abandon operations during extreme storms.

Schlumberger Limited (2011)



Spectra Energy's businesses may be impacted by tropical storms (hurricanes) and sea level rise in the future that could result in flooding or damage to facilities. Both would result in outages and disruption of operations of approximately \$5-\$10mm. In 2012 Hurricane Sandy resulted in Spectra Energy facilities losing power at nine compressor stations and 71 meter stations; six meter stations and valve sites sustained physical damage. Approximate cost of physical damage to Spectra Energy's assets in the northeast due to Hurricane Sandy is in the range of \$250k to \$350k.


Spectra Energy Corp (2013)

In 2011, DCP Midstream incurred curtailments due to the effects of winter storms, which had a financial impact on earnings of ~\$6.5 million. [...]

Financial implications may be of the magnitude experienced in 2011, when Union Gas earnings were affected significantly by weather during the winter heating season. It experienced a \$115 million increase in customer usage of natural gas due to weather that was more than 4% cooler than in 2010.

Spectra Energy Corp (2012)



Spectra Energy's businesses may be impacted by tropical storms (hurricanes) that may result in outages and disruption of operations that may be of the magnitude of those experienced in 2009, for example, when the operating revenues in U.S. Transmission were impacted by a \$9 million decrease in interruptible transportation revenue due to weather and other market conditions and in 3Q 2008 Field Services, a Spectra Energy joint venture, experienced approximately \$25 million of lost business due to Hurricane Ike.

Spectra Energy's businesses could be impacted by a change in mean (average) temperature over the long term. Financial implications may be of the magnitude experienced in 2010, when Union Gas earnings were affected significantly by weather during the winter heating season. It experienced a \$14 million decrease in customer usage of natural gas due to weather that was more than 8% warmer than in 2009.

Spectra Energy Corp (2011)

Financials

Description of risks and potential financial implications

Indirectly, due to the fact that our companies provide clients with insurance and reinsurance protection from the impact of natural catastrophes, including weather events that may become more frequent or severe due to global warming, ACE experiences risk through its clients. Specifically, related to precipitation extremes and droughts, the areas exposed are property and crop coverage, which collectively comprise approximately 40% of our gross written premium annually. The risk is that actual losses in a given year may exceed the underlying underwriting and actuarial assumptions used to price products, thereby eroding profitability and, in extreme instances, shareholder capital. [...]

As a global property and casualty insurer, ACE is exposed to potential losses from various types of weather related events. In particular, natural catastrophe related losses are reported annually and as needed for extraordinary events or periods. In 2012, ACE recorded net pre-tax catastrophe losses of \$633 million, primarily from Superstorm Sandy in the U.S., compared with net pre-tax catastrophe losses of \$859 million in 2011.

Ace Limited (2013)

In 2011, ACE recorded net pre-tax catastrophe losses of \$859 million, which included weather-related events in the U.S., Australia and Thailand, compared with \$366 million in 2010.

In October 2011, flooding in Thailand caused a daily average 7% of ACE employees to be absent from Oct 13-Oct 16th. In another example, an early and unexpected snowstorm hit the eastern US in October of 2011, causing a 4-day power outage at ACE's Windsor, CT office, which resulted in the closure of the office for 27 hours.

In Quarter 1 of 2010, ACE was forced to close several office locations around the world due to severe weather—including flooding from storms.

Ace Limited (2012)

In 2010, we recorded net pre-tax catastrophe losses of \$366 million compared with net pre-tax catastrophe losses of \$137 million in 2009. The catastrophe losses for 2010 include, for example, weather-related events in the U.S., Australia and Europe. In the first half of 2011, catastrophe losses for ACE have surpassed those it experienced in all of 2010, including significant losses from flooding in Australia and heavy tornado and severe thunderstorm activity in the U.S.


Changes in precipitation patterns may cause flooding, inhibiting employees ability to commute to the office. In Quarter 1 of 2010, ACE was forced to close several office locations around the world due to severe weather—including flooding from storms.

Ace Limited (2011)

We consider the greatest areas of potential catastrophe losses due to hurricanes generally to be major metropolitan centers in counties along the eastern and gulf coasts of the United States.

As a property and casualty insurer, we may face significant losses from catastrophes and severe weather events. As of December 31, 2012, we are below our goal to have no more than a 1% likelihood of exceeding average annual aggregate catastrophe losses by \$2 billion, net of reinsurance, from hurricanes and earthquakes, based on modeled assumptions and applications currently available. Our historical catastrophe experience includes losses relating to Hurricane Katrina in 2005 totaling \$3.6 billion, and Hurricane Andrew in 1992 totaling \$2.3 billion.


Allstate Corporation (2013)



Flooding in Thailand directly and severely affected the local computer disk drive and component manufacturing industry, shutting down hundreds of factories and causing a significant downturn in the global supply of disk drives. This in turn led to many tech companies revising down their financial projections for the third and fourth quarters of 2011.

Over the next 5 years, emerging markets could grow at twice the pace of developed markets, raising their GDP share to 65%. We have the opportunity to play a significant role in working with clients in these markets, and we target a significant increase in our market share over the next few years. If we were not focused on prioritizing risk assessment and management for emerging markets, the viability and sustainability of our businesses in these markets could be directly affected.


Bank of America (2012)

BNY Mellon global payments processing averages \$1.5 trillion USD per day. The potential revenue impact associated with risks from climate change could reach the multi-million dollar range or higher, depending upon the specific event through potential lost productivity and damage to owned assets. [...]


Changes in temperature in regions where we own and operate physical real estate has the potential to cause increased natural gas and/or electricity consumption in an estimated amount of five percent of our total energy cost. This equates to approximately \$3.65M USD additional operating cost. We will continue to manage this risk by procuring supply side energy commodities (in deregulated energy markets) to obtain the lowest possible cost and price certainty (through fixed cost options) and through ongoing real estate energy efficiency programs. BNY Mellon's energy procurement services cost is approximately \$80K USD per year. Capital projects pertaining to energy savings programs minimally total \$5M USD per year.

BNY Mellon (2013)

The largest single event in our company's history, in terms of insured losses, was a May 2011 storm system that included a tornado in Joplin, Missouri and hail in the Dayton, Ohio area. Our aggregate insured losses from that event, before reinsurance, were estimated at \$235 million.

Cincinnati Financial Corporation (2012)

According to the Insurance Information Institute, 2011 total insured losses in the United States totaled \$35.9 billion (above the 2000-2010 average loss of \$23.8 billion) arising from 171 catastrophic events. These included a very active thunderstorm (tornado-hail) season, with insured losses exceeding \$25 billion, more than double the previous record, and Hurricane Irene. In the 2011 calendar year, The Hartford reported a larger than usual amount of losses from catastrophes—\$745 million. \$320 million in weather-related losses occurred in P&C commercial insurance, which was up from \$152 million in 2010. In 2011, these primarily included severe thunderstorms and tornadoes in the Midwest and Southeast, Hurricane Irene in the Northeast, Tropical Storm Lee, and winter storms earlier in the year in the Northeast and Midwest. In personal lines (homeowners and auto) total Hartford insured losses were \$425 million (up from \$300 million in 2010), caused primarily by severe tornadoes, hail and thunderstorms in the Midwest and Southeast and Hurricane Irene.

The Hartford Financial Services Group, Inc. (2012)





2011 was a significant year for intense weather patterns, especially for record heating days in some regions. Excess snow and inclement weather affected our operating and energy budgets due to winter snow removal and energy used to manage indoor air temperature.

**PNC Financial Services
Group, Inc. (2012)**



2010 was a significant year for intense weather patterns, especially the severe winter in the Northeast. Excess snow and inclement weather affected our operating and energy budgets by more than \$3M due to winter snow removal and energy used to manage indoor air temperature. In addition, hurricanes and other major storms can cause flooding and building damage, resulting in increased maintenance costs and lost hours of business operation.

**PNC Financial Services
Group, Inc. (2011)**




While it is difficult to link a particular weather event to climate change, the 500-year flood event at Opry Mills in 2009 resulted in the closing down of the property and cost tens of millions of dollars.

Simon Property Group (2011)




Health Care

Description of risks and potential financial implications




The major sites are exposed to increased volatile and extreme weather events (hurricanes, droughts and wild fires). We have seen an increase in volatile and extreme events at 2 of our major sites. Each of these extreme events impact the business operations.

Biogen Idec Inc. (2011)

Lilly's human and animal health drug production process relies heavily on the use of water in the manufacturing process. Changing precipitation patterns in terms of geographical variability (especially decrease in mid-latitude regions) and increases in periods between rainfalls in existing locations could represent a risk to Lilly's production/operational capacity.

Eli Lilly & Co. (2013)

Changes in temperature in certain regions of the US and the world have the ability to influence disease vectors and the spread of infectious diseases as well as the frequency and the severity of chronic illnesses. If this were to happen, it could lead to increased incidences of chronic illnesses and in the type of clinical services Humana will need to offer its members.

Humana Inc. (2013)



Industrials

Description of risks and potential financial implications

Any increase in the number or severity of hurricanes on the eastern half of the United States could result in significant business interruptions and expenditures. CSX operates in an outdoor environment, providing freight rail service across 23 states on the eastern half of the United States. Consequently, CSX employees, track infrastructure, locomotives and railcars are all susceptible to weather events. Hurricane events can temporarily interrupt operations in a specific area by creating unsafe work conditions. Extreme winds or flooding resulting from hurricane activity can damage track structure or signal systems and lead to an increase in repair or recovery costs in addition to interrupting operations. While it is difficult to predict the magnitude and financial implications of future weather events, prior events can provide an indication of future risk. For example, CSX spent \$440 million responding to and recovering from the effects of Hurricane Katrina in 2005. This cost included the recovery of approximately 100 miles of track and repair to buildings and systems in Louisiana, Mississippi, and Alabama. In 2012, recovery from Hurricane Isaac cost approximately \$29 million, including engineering and re-routing costs as well as infrastructure repair.

CSX Corporation (2013)


Physical risks of climate change, in particular flooding and water shortages, have the potential to damage our facilities as well as our value chain's facilities, causing disruption in work. Electricity and fuel shortages and transportation interruptions could adversely affect production and lead to supply chain disruptions and reduced revenues as well as increased operational costs. Lockheed Martin has experienced risks associated with precipitation extremes and droughts at our facilities. For example, in June 2012, drought conditions in the Colorado Springs, Colorado, area contributed to the spread of wildfires in the Waldo Canyon area, just a few miles west of our Colorado Springs campus. In order to protect the campus buildings from the threat of fire, the landscaped areas around the buildings were kept wet, requiring the use of an additional 90,000 gallons of water. In addition, during times when prevailing winds carried the smoke plume in the direction of the campus, building air intakes/exhaust were adjusted hourly in order to protect indoor air quality. Water use charges in Colorado Springs are expected to increase significantly over the next 10 years. Lockheed Martin anticipates that the extreme weather events associated with climate change could have an increased impact on operations in the upcoming decades.

Lockheed Martin Corporation (2013)

In September 2011, a Lockheed Martin facility in Owego, New York experienced a state of emergency due to extreme flash flooding, with the local river rising 2-3 times higher than flood stage. Sub-stations, utility lines and highways were underwater, and the site was closed for four days without electricity, natural gas, or potable water supply. The site faced major groundwater issues, having to run sump pumps continuously with limited use of hoses and fuel lines. Without water supply the site could not produce steam or operate the main power plant generator, which utilizes the public water supply for cooling.

In 2011, Texas faced its hottest summer on record, coupled with harsh droughts over many regions of the state. As temperatures increased, the demand on the regional water supply became more and more stressed. Several of Lockheed Martin's largest manufacturing facilities are located in Texas and felt the pressure of rising temperatures and water restrictions.

Lockheed Martin Corporation (2012)




Extreme temperature changes, changes in precipitation, droughts, or an increase in the number or intensity of extreme weather events in the U.S. can negatively affect our customers and result in a decline in requests for UP's services. For example, a reduction in UP's agricultural shipments can result in a decline in UP business and revenues. In 2012, UP's agricultural revenue declined 1%, driven by a 4% reduction in volume. Transportation of grains, commodities, and food and beverage products generated 17% of the Railroad's 2012 \$20.9 billion freight revenue. Corn shipments declined 11% for the year, reflecting the impact of the U.S. drought that reduced production in UP served origins.

Union Pacific Corporation (2013)




Union Pacific managed record snowstorms, a snow avalanche, a record flood in the Midwest and a record drought in Texas in 2011. The New Year began with a large winter storm that ranged from New Mexico, across the Midwest to the Northeast, impacting our operations in Nebraska, Iowa, Illinois, Missouri, Kansas, Oklahoma, Arkansas, and Texas, causing delays at key terminals. The record winter storms led to record snowmelt and flooding. Heroic efforts and cooperation with governmental agencies, including dropping sand bags from a helicopter to close a breach to a berm and raising 75 miles of track above the floodwaters, kept Union Pacific's key lines operating. While the Midwest experienced record floods, severe heat and drought conditions compromised Union Pacific's track structure across Texas, resulting in damage to the track. Both reduced our velocity and our efficiency.

Union Pacific Corporation (2012)

When changes in precipitation patterns result in drought or flood conditions, the function of MSW landfills, which are fully open-air, weather exposed entities, are affected. Specifically, the rate of decay of organic material in the landfill and the landfill gas generated from the decay are impacted, and operational costs are incurred to respond to the extremes. Virtually any of WM's landfills in the U.S. and Canada are vulnerable to intermittent drought conditions, flood conditions or both.

Both flooding and drought impact the behaviors of materials decaying in a controlled MSW landfill environment. Flooding can impede the collection of landfill gas by filling collection wells with water; drought can reduce the rate of decay of organic material because water is essential to the decay process. Both extreme conditions result in additional labor being required to manage the landfill gas collection system, with additional liquids collection required to respond to excess moisture and with adjustments to gas collection system vacuum required to respond to the decrease in gas generation resulting from too little moisture. Also, additional labor and cost is incurred in describing changing landfill conditions caused by weather to regulatory agencies and justifying necessary response actions to these agencies. Also, although WM is not a high volume water user, temporary disruptions in water supply could affect our operations.

Waste Management, Inc. (2013)



Information Technology

Description of risks and potential financial implications

Potential financial implications of temperature extremes include excessive use of cooling and heating strategies and even loss of power itself. The latter would be detrimental for the data centers which house the product for the SAAS operation. Costs would include utility costs, which will exceed the current estimated \$4.4 million of utility spend; starting the facility back up should the power suddenly turn off which could be an estimated \$5 million and the costs of impacts on the business which could be several million dollars.

Adobe Systems, Inc. (2012)

The risk of increased tropical cyclones could impact a number of Compuware facilities. This risk occurred recently in Japan and resulted in the inability to do business from the local facility for a short period of time.

Compuware Corp (2011)

Nature of the physical effect concerned: Google must cool its data centers to keep them in operation, and the amount of energy needed for the cooling is related to the outside air temperature. Hence, if global temperatures increase, this will increase the amount of energy required to cool the data centers, and increase the cost of running our operations. Location of this physical effect concerned: Given that climate change is expected to increase average temperatures globally, and we have facilities and operations around the world, this is a risk we face at all of our facilities globally.

Google Inc. (2013)

Potential Financial Implications: From an operations perspective, physical risks such as precipitation extremes and flooding could cause short term revenue delays or increased manufacturing or shipping costs, as well as long term disruptions that could provide an impetus for reconfiguring our operations or supply chain. While HP regularly makes changes to our supply chain based on the return on the investment and risk analysis, in the case of physical disruptions we would incur similar costs to maintain the supply chain. The inability to support ongoing demand for components may result in reduction of revenue, gross margins in HP's businesses.

For example in late July 2011, Thailand began experiencing severe flooding that caused widespread damage to the local manufacturing industry. HP obtains disk drive components used in its PCs, servers and storage devices from suppliers with operations in Thailand that were severely impacted by the flooding. HP experienced short-term reduction in the supply of these disk drive components; industry supply of hard disk drives was about 30% below the expected demand in calendar Q4. HP revenue of \$30.0 billion was down 7% as reported or 8% in constant currency year on year. We estimate that more than half of the revenue decline was due to the hard disk drive shortage that impacted both the Personal Systems Group (PSG, now part of PPS) and Enterprise Servers Storage and Network Group (ESSN) due to the flooding event in Thailand. Based on this previous example, assuming all declines in revenue were a direct result of the flooding event, the cost of a similar regional flooding event, such as the one described in Thailand, could potentially result in a financial implication of an approximate \$1B decline in HP's annual revenue.

Hewlett-Packard (2013)

In the SF Bay Area, sea level rise is a significant risk for companies and residents. The financial impacts on NetApp could be significant—either from flooding in the campus area or from flooding elsewhere that makes it difficult for our employees or customers to reach our campus. Depending on the scope and during of the flooding, such an incident could cost from between \$10K and \$1MM to mitigate.

NetApp Inc. (2013)



Thailand experienced severe flooding in July 2011 that caused widespread damage to the local manufacturing industry. PC manufacturers obtain disk drive components used in their PCs from suppliers with operations in Thailand that were severely impacted by the flooding. These PC manufacturers experienced a short-term reduction in the supply of these disk drive components. As a result, in NVIDIA's fourth quarter of fiscal year 2012 shipments of PCs by some PC manufacturers were reduced, which reduced the demand for NVIDIA's Graphics Processing Units (GPUs). In addition, higher disk-drive prices constrained the ability of some PC manufacturers to include a GPU in their systems which also reduced demand for our GPUs and negatively impacted our financial results for the fourth quarter of fiscal year 2012.

NVIDIA Corporation (2012)



The potential for climate extremes to impact our cost of operations; for example Symantec's Dublin Ireland facility experienced Coldest winter in 18 years, which resulted in significant increases in operation costs and associated scope 2 emissions. We heated the building for our employee thermal comfort but unfortunately the natural gas utility consumption nearly doubled, increasing our utility spend by over \$50,000 from the previous year.

Symantec Corporation (2011)



Materials

Description of risks and potential financial implications

Reduced periods of precipitation in the Southeast of the United States in 2010 resulted in decreased hydroelectric generation at our four hydroelectric facilities. Similar low levels of precipitation in Brazil in the same time period resulted in higher cost of hydro-based electricity for Alcoa Aluminio (Brazil) operations. Recent drought conditions in Western Australia have strained bauxite refinery operations.

Alcoa Inc. (2012)

In the past, major hurricanes have caused significant disruption in Dow's operations on the U.S. Gulf Coast, logistics across the region, and the supply of certain raw materials, which had an adverse impact on volume and cost for some of Dow's products. Due to the company's substantial presence on the U.S. Gulf Coast, similar severe weather in the future could negatively affect Dow's results of operations. Hurricanes Gustave and Ike, which hit the U.S. Gulf Coast in 2008, caused temporary outages for several of the Company's Gulf Coast production facilities and resulted in \$181 million in additional operating expenses.

Dow Chemical Company (2011)


The International Paper Vicksburg Containerboard Mill temporarily shut down production from May 2011 through June 2011 as a result of Mississippi and Yazoo River flooding and transportation disruption. Teams at the Vicksburg, Miss., containerboard mill began a temporary shutdown in anticipation of flooding and transportation disruption. "In light of current flooding estimates, we are taking prudent measures to temporarily shut down the mill. Our first concern is the safety and well-being of our employees, as well as protecting the mill's equipment and other assets," said Tom Olstad, mill manager. "We have detailed plans in place to conduct an orderly shutdown of production and secure the mill site and equipment in the event of flooding, and we are working closely with our supply chain and customer service teams to minimize impacts to our customers." Most of the mill's 296 employees were temporarily laid off during the shutdown period, with only a minimal skeleton crew remaining on site to help ensure the integrity of the mill property and assets. Rising flood levels disrupted rail traffic and truck routes to the mill. Mill production resumed in June 2011 once floodwaters receded. We successfully managed around this event by meeting demands through other IP facilities.

This was not the first time that the Vicksburg Mill faced weather-related threats. In April 2010, the mill experienced a threat when a series of tornadoes ripped through Mississippi, one of which impacted many employees at the Vicksburg Mill. At least two employees suffered complete loss of their homes and personal property, and at least five others sustained significant damages to their homes. The mill, which was in its annual outage, experienced minor damage and a temporary loss of power.

International Paper Company (2012)


Impacts to agriculture: Mosaic's main product is fertilizer, and fertilizer demand can be directly affected by the impact of climate change on agriculture. Physical risks from climate change that can affect agricultural production and the demand for fertilizer products include changes in temperature. Changing growing seasons in already dry areas could make growing crops using traditional methods increasingly difficult.

The Mosaic Company (2013)



In 2011 our Louisiana site was affected by record regional rainfall and associated flooding which was forced to close for over one month due to flood conditions along the Mississippi River.


The Mosaic Company (2012)

Nearly all climate change models predict that most regions of the world will experience an increase in severe weather events. Severe weather is a threat to Newmont's productivity, existing equipment, and worker safety. Many Newmont regions are expected to see an increase in isolated storms with heavy rainfall accumulation leading to flooding, erosion, and operational delays. For example, our Asian Pacific Islands operations are susceptible to impacts from tropical cyclones and storm surges, which may impact transportation routes and delay operations.


[...] Severe weather events can lead to operational delays and increased operational costs. Storms may impact transportation routes creating delays in the deliveries of necessary supplies and equipment. Severe weather such as extreme rainfall can impact energy sources and cause structural damage, causing further operational delays and additional expenses. Capital costs may increase 10-20 percent for structural designs that withstand severe weather.

Newmont Mining Corporation (2013)

In 2011, PPG declared force majeure for certain optical products as a result of significant flooding in Thailand, which impacted PPG's optical products manufacturing and distribution operations.


PPG Industries (2012)

Catastrophic events caused by natural disaster could disrupt the operations of the company and/or its customers and suppliers and could have significant adverse impact on the results of the operation. The occurrence of natural disasters, such as hurricane or earthquake, could disrupt or delay the company's ability to produce and distribute its products to customers and could potentially expose the company to third party liability claims. In addition, such events could impact the company's customers and suppliers resulting in temporary or long-term outages and/or the limitation of supply of energy or other raw materials used in normal business operations. [...]

Praxair regularly evaluates the potential scale, incidence and likelihood of weather-related risks. For example, the replacement cost of a single large Praxair facility could be more than \$50 million. On a long-term average annual basis, the Praxair, Inc. portfolio is expected to sustain over \$3 million in hurricane ground up loss.

Praxair, Inc. (2013)


If severe weather were to cause an unexpected stop in production at one of our major manufacturing facilities, our sales would be directly affected. Sigma-Aldrich manufactures approximately 60% of our sold products, which equates to approximately \$1.5 billion in sales annually. If severe weather stops production at a facility that manufactures as little as 5% of our manufactured goods, our sales could drop as much as \$25 Million to \$45 million. Sigma-Aldrich would also incur the costs to repair any building/property damage.

Sigma-Aldrich Corporation (2013)



Telecommunications


Description of risks and potential financial implications



Changes in average temperatures could make energy predictions more variable. This can throw off our energy use patterns and potentially increase costs if we're not adequately prepared to handle it. If there is an increase or decrease in the average temperature over the long run, this could also impact our energy costs by requiring more energy to heat and cool. The exact financial implications of temperature increases are difficult to calculate but if we assume that Cooling Degree Days (CDD) increased an average of 5 percent, and we further assumed that there was a resulting increase of 5 percent in demand for electricity, this would equate to an increased annual energy cost of over \$66 million. [...]

If we had to change 50% of our top water sites from water cooled chillers to air cooled chillers, the increased energy costs would be over \$17 million a year.

AT&T Inc. (2013)



Superstorm Sandy provides a recent reminder of the potential impact of extreme weather on the U.S. economy and Verizon's networks. While no one knows if storms like Sandy are an aberration or the new norm, the total long-term cost of Sandy is estimated to exceed \$50 billion. Our company has spent significant time and money rebuilding its wireline and wireless networks in the New York and New Jersey areas and we reported a 7-cent-per-share impact due to the storm in our 4th quarter 2012 earnings.

Verizon Communications Inc. (2013)



Utilities

Description of risks and potential financial implications


The physical effect of climate change and changes in temperature extremes could result in higher or lower sales of power and natural gas. In particular, the warming of the climate could increase electricity sales and reduce gas sales for heating load. Climate extremes could result in premature equipment failure caused by higher temperatures or could limit our ability to respond to weather-related outages. Also, the physical impacts of climate change could potentially affect transmission and distribution service, due to higher temperatures that could create a greater potential for transformer failure from reduced transformer cooling. Changes in weather patterns that alter wind patterns and cloud cover could affect the performance of renewable generation facilities, like wind and solar generation, and related system operations. Also, customer usage patterns and levels may change as a result of these changing weather patterns. The operating efficiencies of Combustion Turbine Generators (CTGs) decrease in higher temperatures, so more CTGs would potentially be needed at higher temperatures. [...]

The physical impacts of climate change may have the potential to significantly affect the Company's business and operations, and any such potential impact may render it more difficult for our businesses to obtain financing or meet customer energy demands. For example, extreme weather events could result in increased downtime and operation and maintenance costs at the electric power generation facilities and support facilities of the Company's subsidiaries. Changes in weather patterns, particularly greater variation in temperatures, could significantly impact customer load patterns affecting system planning and operations. The physical effects of climate change may affect the volume of sales of power and natural gas. In particular, the warming of the climate could increase electricity sales and reduce gas sales for heating load. This could result in additions or reductions to revenues for Ameren, depending on the level of warming during different periods.

Ameren Corporation (2013)

Changes in mean precipitation could impact the water levels in the Missouri, Mississippi and Illinois rivers and affect the operation of a number of Ameren's power plants. Low water levels in these rivers have the potential to negatively affect the efficiency of plant operations and a plant's ability to meet thermal discharge effluent regulatory limits. This could result in load reductions and/or plant shutdowns. Low water levels could potentially force the installation of cooling towers at the plant, requiring a large capital investment. Also, the loss of water supply could have an adverse effect on the operations of the wet scrubbers at the Sioux plant in Missouri and at the Duck Creek and Coffeen power plants in Illinois. These shutdowns could affect Ameren Energy Resource's ability to comply with the Illinois multi-pollutant standard (MPS) requiring significant reductions in sulfur dioxide and nitrogen oxide emissions.

Ameren Corporation (2012)





Snow and ice—Managing the vegetation on our rights of way is a key component of maintaining our transmission and distribution system reliability. Overgrown vegetation is a risk to reliability during snow and ice storms. The weight of the snow and ice weighs down branches that can break and fall on power lines. Typical industry practice is to manage the trees and vegetation around power lines on a cyclic basis. Achieving and maintaining a regular tree-trimming cycle is expensive and directly affects what customers pay for electricity. During the past four years, the AEP system spent approximately \$881 million, or an average of \$220 million per year, on vegetation management. In 2011, we spent more than average, at \$235 million. We continue to look for innovative approaches and improvements to our integrated vegetation management practices that create habitats for wildlife yet ensure reliability.

Across our service territory, floods and tornadoes caused problems in 2011. Heavy spring and summer rains led to floods that hampered our ability to deliver coal to a plant in Indiana. A sudden storm that dropped four-and-a-half inches of rain within 45 minutes, flooding the coal yard at the John Amos Plant in West Virginia, required employees to wear life jackets to do their jobs until the water receded. For the first time in its history, the Cook Coal Terminal in Metropolis, Ill., which receives Powder River Basin coal by train and loads it onto barges, was unable to deliver coal because the Ohio River was too high. This affected coal deliveries to our Rockport Plant in Indiana—the terminal's largest customer—for two separate 20-day stretches.


Severe droughts in Texas raise concerns for several of our plants, even though they are located on reservoirs built specifically to supply the plants. Operation of our 896-MW natural gas-fired Wilkes Plant was threatened last summer because of low water levels. The Oklaunion, Welch, Knox Lee and Pirkey plants in Texas are all dealing with periodic low lake levels that will require monitoring. If rainfall does not return to normal in 2012, some production could be threatened.

American Electric Power Company, Inc. (2012)

AEP's and other utility systems were tested by weather extremes in 2010. For example, an extreme cold weather snap tested the electricity system in the Lower Rio Grande Valley in Texas in February 2011. A loss of supply and high demand led to rolling blackouts across the state that affected many AEP Texas customers. The event, which remains under investigation by federal and state regulators, could potentially lead to even stricter reliability rules for the industry.


American Electric Power Company, Inc. (2011)

The uncertainty associated with the physical risks of climate change make it difficult to quantify the costs associated with increase precipitation, frequency and severity of extreme weather events and sea level rise. However, the cost of past events give insight into potential future costs. In 2011, our Eastview service center in Westchester County, New York—which is located in the 100 year flood zone—was flooded when the Saw Mill River overflowed its banks and impacted the facility 5 times. As a result, materials stored there, including electrical equipment, were damaged for a total of \$388,000. The cost to design and build a raised platform to store inventory and reduce risk of contact with flood water was an additional \$850k. In 2012, the cost of restoration efforts after Superstorm Sandy for both Con Edison of New York and Orange and Rockland incurred response and restoration costs for Superstorm Sandy of \$431 million and \$90 million, respectively.


Consolidated Edison, Inc. (2013)





The physical risks associated with climate change will compel Con Edison to build greater resilience into its electric, gas, and steam delivery infrastructure. The cost to build such resilience is incalculable at this time, but the company has made rough approximations to understand the magnitude of financial risk. The costs identified here are order of magnitude approximations; they are not meant to be definitive or indicative of future rate case submissions. Building resilience into the electric distribution system and transmission systems may cost more than \$100 million per system. Building resilience for facilities, substations, and network transformer equipment may cost between \$10-50 million per asset class. Finally, protecting our steam generation facilities from sea level rise and storm surge may cost between \$1 million-\$10 million per facility.

Consolidated Edison, Inc. (2012)

Higher volumes of precipitation can saturate soils and weaken support for electric distribution poles; high volumes of snowfall over the winter of 2009/2010 were thought to have been contributing factors to utility poles being toppled when a severe winter storm hit our service territory in March 2010. This single event contributed to nearly 170,000 customer outages over the course of one weekend, and points to the fact that additional precipitation resulting from climate change will put new demands on our electric infrastructure. Record high snowfall in the winter of 2010/2011 resulted in an increased use of road salt in NYC, which affected our underground electric system. The combined result of these two 'extraordinary' winters has been to put greater emphasis on Con Edison's ability to quickly, responsibly, and safely respond to storm damages and restore energy-delivery services to our customers.

Consolidated Edison, Inc. (2011)





The financial implications of these risks include infrastructure damage and loss of sales, and possibly customers, due to extreme weather resulting from and worsened by these physical factors. It is plausible that the financial implication may be similar to those experienced in the past ~\$370 - \$1.5 billion and in 2012. As an example, Entergy suffered approximately \$1.5 billion in restoration costs as a result of Hurricanes Katrina and Rita in 2005. In 2012, Hurricane Isaac caused extensive damage to portions of Entergy's Louisiana service territory including its distribution infrastructure and loss of sales during power outages. Restoration costs are estimated at ~\$370 million. In addition, Entergy funded with the America's WETLAND Foundation a \$4.2 million Gulf Coast Adaptation Study that shows communities along the Gulf Coast could suffer nearly \$700 billion in economic losses (\$350 billion direct, \$350 billion indirect) over the next 20 years due to growing environmental risks. The livelihoods of 12 million people living near the coast, the sustainability of rich natural resources that support \$634 billion in annual GDP, and the security of residential, commercial and industrial assets valued at more than \$2 trillion are increasingly vulnerable to storm surge, flooding, wind damage, and the effects of sea level rise.

Changes in temperature extremes and weather result in variances in Entergy's electricity sales and changes in peak demand. Billed electricity usage increases in periods of extreme warm weather, decrease in periods of milder weather, while ice storms can cause severe damage to Entergy's transmission and distribution infrastructure. It is plausible that financial implications are similar to those experienced in 2012— ~\$50 - \$80 million. Entergy experienced a decrease in net revenue in 2012 compared to 2011 of \$80 million due to the effect of milder weather on sales volumes. In 2012, Entergy Arkansas experienced significant damage estimated ~\$55-65 million to its infrastructure associated with an ice storm. The increase in extreme heat drives up demand for air conditioning load and the peak generating capacity needed to reliably meet that load and provides a disproportionately large impact on low income families where the cost of energy makes up a large portion of their household income. We estimate as many as 25% of our 2.4 million residential customers are at or near poverty levels.

Entergy Corporation (2013)






Exelon spent over 140 million in 2011 on storm related overtime, contracting and materials to restore service for electric transmission and distribution. Outages from storm events in 2011 far exceeded estimates, which are based each year on historical averages. [...]

Climate change could affect the availability of a secure and economical supply of water in some locations, which is essential for Exelon Generation's continued operation, particularly for the cooling of generating units. Drought-like conditions can impact Exelon Generation's ability to run certain generating assets at full capacity due to cooling water discharge temperature restrictions and flow restrictions. These conditions, which cannot be accurately predicted, may cause Exelon Generation to seek additional capacity at a time when wholesale markets are tight or to seek to sell excess capacity at a time when those markets are weak.

In 2011, Exelon spent approximately \$1.6 million on water use rights, and an additional \$0.7 million on water permitting and monitoring fees relating to cooling water at its nuclear generating plants. Two sites did experience lost revenue associated with water supply related issues.


Exelon Corporation (2012)

Exelon spent approximately \$104 million in 2010 on storm related overtime, contracting and materials to restore service for electric transmission and distribution. Storm events in 2010 were found to exceed estimates based on historical averages.

In 2010, Exelon spent approximately \$1.3 million on water use rights, and an additional \$0.8 million on water permitting and monitoring fees relating to cooling water at its nuclear generating plants. Two sites did experience lost revenue associated with water supply related issues.

Exelon Corporation (2011)





On August 28, 2011, Tropical Storm Irene caused extensive damage to the Company's electric distribution system resulting in incremental restoration costs of \$135.6 million. Approximately 800,000 of our 1.9 million electric distribution customers were without power at the peak of the outages, with approximately 670,000 of those customers in Connecticut. On October 29, 2011, an unprecedented snowstorm inundated our service territory with heavy snow, causing significant damage to our distribution and transmission systems resulting in incremental restoration costs of \$218.5 million. Approximately 1.2 million electric distribution customers were without power at the peak of the outages.

In terms of customer outages, this was the most severe storm in CL&P's history, surpassing Tropical Storm Irene; the third most severe in PSNH's¹ history, following a December 2008 ice storm and a February 2010 winter storm; and the most severe in WMECO's² history.

As a result, in November 2011, CL&P established a storm fund reserve of \$30 million to provide bill credits to its residential customers who remained without power after noon on Saturday, November 5, 2011, as a result of the October snowstorm, and to provide contributions to certain Connecticut charitable organizations. Incremental restoration costs related to the two storms consist of \$311.7 million in costs that are deferred for future recovery and \$42.4 million in costs that are capitalized, for a total of \$354.1 million. We believe our response to both storms was prudent and therefore we believe it is probable that CL&P, PSNH and WMECO will be allowed to recover these storm costs. Each operating company will seek recovery of its estimated deferred storm costs through its applicable regulatory recovery process. As part of a merger settlement in Connecticut, CL&P agreed not to recover \$40 million of its deferred storm costs. Those costs will be written off in the second quarter of 2012.

Northeast Utilities (2012)





In 2011, in Texas, unusual frigid weather in February led some power plants to come down. In the summer, hot weather and high load caused led almost to brown and black outs.

NRG Energy Inc. (2012)




¹ Public Service of New Hampshire, a Northwest Utilities company
² Western Massachusetts Electric Company, a Northwest Utilities Company




On August 17, 2010, NRG's Big Cajun 2 coal plant in New Roads, Louisiana experienced a torrential rain event that led to six inches of rain in a two-hour time span and stopped the operations of certain equipment for a few hours.

NRG Energy Inc. (2011)

Pepco, DPL and ACE incurred significant costs associated with Hurricane Irene in late August 2011, during which approximately 445,000 customers were without power at the height of the storm. [...] The total costs of the restoration efforts associated with Hurricane Irene have been estimated to total \$48.8 million.


Pepco Holdings, Inc. (2012)

SDG&E has been subject to numerous lawsuits and settlements arising out of the San Diego County wildfires in 2007. To maintain current liability insurance levels, Sempra has had to purchase \$92 million in incremental general liability and wildfire liability insurance since 2010 and this is expected to be an ongoing expense.

Our South American utilities are already incurring higher costs for power purchases due to drought conditions that have resulted in a shift away from hydroelectric resources. [...] For our South American utilities, Luz del Sur and Chilquinta Energía, hydroelectric power comprises a significant portion of their purchased power contracts. There, drought conditions that reduce the availability of hydroelectric power resources require shifting to more expensive, inefficient and higher-emitting sources of power such as diesel.

Sempra Energy (2012)

To the extent there are changes in precipitation and drought, the risk of wildfires in the southwest increases, putting our infrastructure at risk. In addition, if overhead power lines owned by our business unit SDG&E are implicated in wildfires, as was the case in 2007, it represents further financial risk. Our facilities in the Gulf region are also prone to heavy rain and hurricanes, which creates additional risk, which is difficult to quantify. We have taken many steps to reduce the risk of power lines sparking wildfires, including a range of fire prevention activities, stakeholder input and advice, hardening of our physical systems and equipment, and purchasing equipment such as anemometers (for measuring wind speed) as well as a fire-fighting helitanker. We have also entered into agreements with local city and county fire-fighting agencies and even hired our own full-time weather forecaster—all to decrease the risk of catastrophic wildfires in the region.

From a cost standpoint, currently, our business unit SDG&E is subject to numerous lawsuits and settlements arising out of the San Diego County wildfires in 2007 and our settlement of claims and defense costs have exceeded the \$1.1 billion of liability insurance coverage. The company expects that substantially all reasonably incurred costs of resolving 2007 wildfire claims that exceed liability insurance coverage and amounts recovered from other responsible parties will be recovered from utility customers. However, recovery from customers requires future regulatory action. A failure to obtain recovery would likely have a material adverse effect on cash flows and operational results. In addition, SDG&E's cash flows may be adversely affected due to the timing differences between resolution of claims and the recovery of costs from other parties or customers, which may extend over a number of years.

Sempra Energy (2011)





Increased energy use due to weather changes may require us to invest in more generating assets, transmission and other infrastructure to serve increased load. Decreased energy use due to weather changes may affect our financial condition, through decreased revenues. Extreme weather conditions in general require more system backup, adding to costs, and can contribute to increased system stresses, including service interruptions. Weather conditions outside of our service territory could also have an impact on our revenues. We buy and sell electricity depending upon system needs and market opportunities. Extreme weather conditions creating high energy demand on our own and/or other systems may raise electricity prices as we buy short-term energy to serve our own system, which would increase the cost of energy we provide to our customers. Severe weather impacts our service territories, primarily when thunderstorms, tornadoes and snow or ice storms occur. To the extent the frequency of extreme weather events increases, this could increase our cost of providing service. Changes in precipitation resulting in droughts or water shortages could adversely affect our operations, principally our fossil generating units. A negative impact to water supplies due to long-term drought conditions could adversely impact our ability to provide electricity to customers, as well as increase the price they pay for energy. We may not recover all costs related to mitigating these physical and financial risks.

Xcel Energy Inc. (2013)



List of companies covered in this report

Company	HQ City	HQ State	Company	HQ City	HQ State
Ace Limited.	Zurich	CH*	Lockheed Martin Corporation	Bethesda	MD
Adobe Systems, Inc.	San Jose	CA	The Mosaic Company	Plymouth	MN
Alcoa Inc.	New York	NY	NetApp Inc.	Sunnyvale	CA
Allstate Corporation	Northbrook	IL	Newfield Exploration Co.	The Woodlands	TX
Ameren Corporation	St. Louis	MO	Newmont Mining Corporation	Greenwood Village	CO
American Electric Power Company, Inc.	Columbus	OH	News Corp	New York	NY
AT&T Inc.	Dallas	TX	Northeast Utilities	Springfield	MA
Bank of America	Charlotte	NC	NRG Energy Inc.	Princeton	NJ
Best Buy Co., Inc.	Richfield	MN	NVIDIA Corporation	Santa Clara	CA
Biogen Idec Inc.	Weston	MA	Pepco Holdings, Inc.	Washington	DC
BNY Mellon	New York	NY	PepsiCo, Inc.	Purchase	NY
Campbell Soup Company	Camden	NJ	PNC Financial Services Group, Inc.	Pittsburgh	PA
Chevron Corporation	San Ramon	CA	PPG Industries	Pittsburgh	PA
Cincinnati Financial Corporation	Fairfield	OH	Praxair, Inc.	Danbury	CT
Compuware Corp	Detroit	MI	Schlumberger Limited	Houston	TX
ConAgra Foods, Inc.	Omaha	NE	Sears Holdings Corporation	Hoffman Estates	IL
ConocoPhillips	Houston	TX	Sempra Energy	San Diego	CA
Consolidated Edison, Inc.	New York	NY	Sigma-Aldrich Corporation	St. Louis	MO
CSX Corporation	Jacksonville	FL	Simon Property Group	Indianapolis	IN
Dow Chemical Company	Midland	MI	Spectra Energy Corp	Houston	TX
Dr Pepper Snapple Group Inc.	Plano	TX	Starwood Hotels & Resorts Worldwide, Inc.	Stamford	CT
Eli Lilly & Co.	Indianapolis	IN	Symantec Corporation	Mountain View	CA
Entergy Corporation	New Orleans	LA	Union Pacific Corporation	Omaha	NE
Exelon Corporation	Chicago	IL	Verizon Communications Inc.	New York	NY
Gap Inc.	San Francisco	CA	VF Corporation	Greensboro	NC
Google Inc.	Mountain View	CA	Wal-Mart Stores, Inc.	Bentonville	AR
The Hartford Financial Services Group, Inc.	Hartford	CT	Waste Management, Inc.	Houston	TX
The Home Depot Inc.	Atlanta	GA	Xcel Energy Inc.	Minneapolis	MN
Hess Corporation	New York	NY			
Hewlett-Packard	Palo Alto	CA			
Humana Inc.	Louisville	KY			
International Paper Company	Memphis	TN			
Johnson Controls	Milwaukee	WI			
The J.M. Smucker Company	Orrville	OH			
Kohl's Corporation	Menomonee Falls	WI			

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