ARCADIS

Building industrial resilience against the industry's top climate-related risks

Climate-related risks to industry are escalating in scale and reach. With impacts becoming costlier and reaching new regions across North America, we surveyed some of our top clients to understand their prevailing vulnerabilities. Analyzing their real-world insights alongside our resilience projects across the sector has provided clarity around shared struggles and, more importantly, opportunities for improvement.

Climate-related impacts are abundant

Seventy percent of respondents have experienced at least one climate-related impact each year. Flooding is by far the most disruptive – half of our survey respondents ranked flooding as the number one potential impact, and for the remaining half, it rarely fell outside the top two. Flooding is a pervasive problem in North America and beyond and stronger storms reach new regions every storm season, as we saw with Hurricane Harvey. Harvey also proved just how dangerous "once a year" impacts can be – the storm knocked out some industry in the area for 3-6 months, not to mention the catastrophic social and environmental impacts felt by the affected communities.

After flooding, we saw much slimmer margins between the impact rankings, which could be tied to regional differences. For example, while wildfires can be just as disruptive as floods, they most commonly impact regions on the west coast, whereas floods are a comparatively widespread problem. (Figures 1-3)

What are the most disruptive climate-related events impacting your facility(ies) operations?

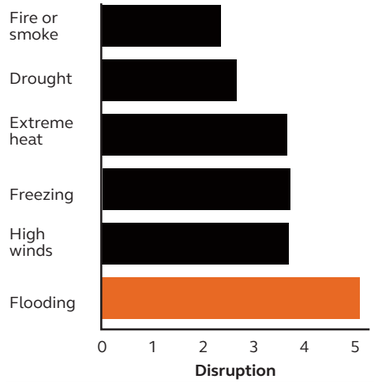

Figure 1

How often do climate-related events impact operational production at your facility(ies)?

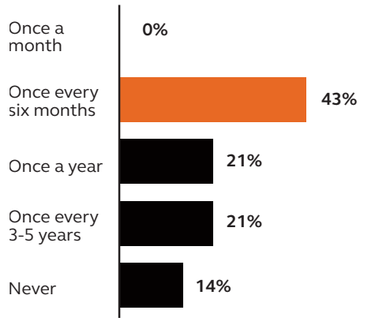

Figure 3

What percentage of your industrial facility(ies) infrastructure is impacted by climate-related events each year?

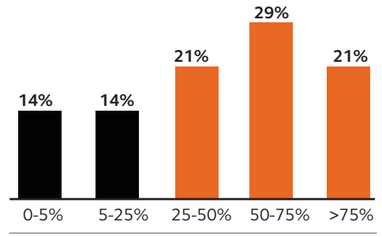

Figure 2

Risk extends beyond the fence line

Planning for the unique vulnerabilities of a facility requires a look both inside and outside the fence line. Outside influences, such as disruption to or failure of power grid systems, water drainage systems, or transportation systems, can be just as disruptive as problems that arise within your property line. In some cases, these outside factors may amplify the issues a facility is already dealing with. Eighty-six percent of industry respondents have seen climate-related impacts compounded by larger societal or surrounding/supporting infrastructure issues, and most respondents are affected by these kinds of issues at least once a year. Some are affected monthly. (Figure 4)

Similarly, the effect of climate-related impacts does not stop with the facility and can cause drastic effects on factors like the supply chain. Nearly half of our respondents have suffered supply chain disruptions caused by climate-related events that are more severe than the physical impacts on facility operations. The pandemic exposed how fragile supply chains can be, and these kinds of issues are compounded when you add a climate-related event to the equation. (Figure 5)

Most importantly, facilities must be prepared for the effects climate-related impacts can have on their workforce. Our most valuable asset is our people, and such impacts can affect worker morale or safety, which also extends beyond the fence line. Workforce commuting complications, for example, can be just as disruptive as on-site challenges. More than half of respondents also noted that climate-related events occasionally cause environmental, health, safety or sustainability concerns for employees. Making people feel safe is paramount to maximizing morale and performance, as well as efforts to attract and retain top talent. While it is tempting to first focus on protecting your facility, risks beyond the fence line cannot be overlooked. (Figures 6 & 7)

How often are the impacts of climate-related events on your facility(ies) compounded by larger societal or surrounding/supporting infrastructure outside your fence lines?

For example, power grid system disruption or failure, water drainage systems, transportation systems, etc.

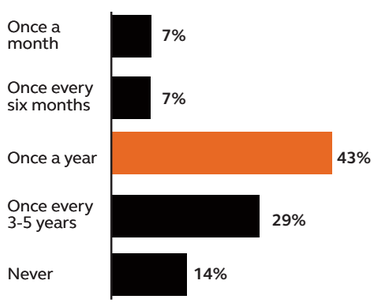

Figure 4

How often are the impacts of climate-related events on your facility(ies) compounded by supply chain disruptions that are more severe than the physical impacts on your own facility operations?

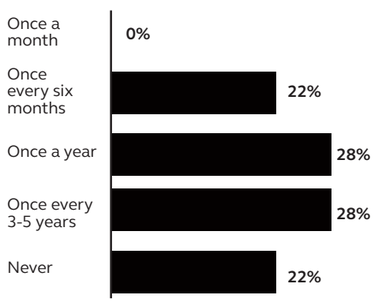

Figure 5

How often do climate-related conditions negatively affect worker comfort/ retention/morale?

For example, difficulty commuting to a facility, power disruptions, or conditions within a facility such as dust or smoke levels, humidity, temperature, etc.

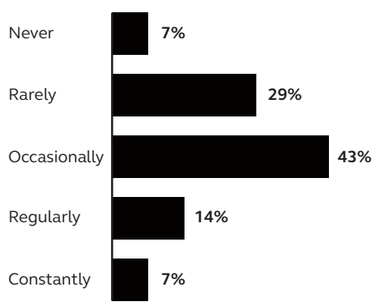

Figure 6

Investment levels fail to align with concerns

After seeing the frequency and variety of impacts suffered by clients, it was no surprise that nearly eighty-five percent have serious concerns about potential infrastructure impacts. However, despite respondents noting a more-than-adequate understanding of their asset vulnerabilities, there has only been a moderate impact on their investments. Most respondents felt capital investment strategies were, at best, marginally aligned with making facilities more resilient to climate-related disruptions, with some noting they were barely aligned. (Figures 8 – 10)

The reason behind the lack of dedicated capital might be that too few organizations have a long-term strategy to invest in. It is hard to get funding, especially compared to projects designed to generate revenue, without a solid business case. Sound strategies are vital to earning stakeholder buy-in and fixing the misalignment between concern and investment levels (Figure 11).

How often have the impacts of climate-related events caused environmental, health, safety or sustainability concerns at your facility(ies)?

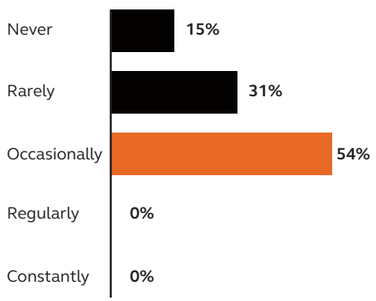

Figure 7

How concerned are you about climate-related infrastructure impacts in your facility(ies)?

How has risk from climate-related events impacted your investment decisions regarding your facility(ies)?

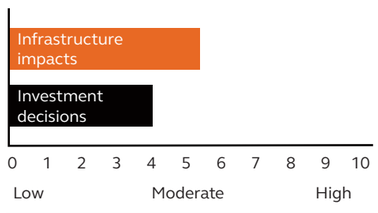

Figure 8

How well do you understand the vulnerability of your assets to climate-related disruptions?

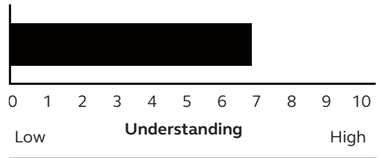

Figure 9

How aligned is your capital investment strategy with making your facility(ies) more resilient to climate-related disruptions?

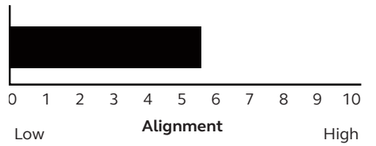

Figure 10

Do you have a long-term strategy in place to make your facility(ies) resilient to climate-related events?

Figure 11

Building a strategy that earns buy-in:

4 essential action items

1. Set your time horizon

It can be difficult to quantify all the risks facing a facility. Developing a time horizon gives teams a finite range to thoroughly explore and plan for potential scenarios. Compared to strategies with limited scopes, such as building to code, deep dives into a defined period keep the focus on maintaining operations when it counts.

Risk can be variable over time, so multiple time horizons can be useful in avoiding risk accumulation over time and preparing for cyclical risks such as legislative cycles, aging infrastructure, or an aging workforce. An alternatives analysis can be a great tool for prioritizing where to start. It incorporates variables such as available capital, priority assets, whether the solution will be permanent or temporary, etc. to strike a balance between protection and cost.

Having choices softens financial impacts, and staging approaches can minimize downtime or even keep a facility running through implementations. Planning a phased risk reduction allows companies to protect the most critical assets first while laying the groundwork for a site-wide strategy as part of long-term capital improvement plans. Instead of being seen as a separate effort, resilience building becomes part of ongoing operational processes.

2. Identify risks outside the property line

Keep in mind what managing risk is all about: achieving your organization's mission and maintaining your level of service. The biggest climate-related impacts will not always happen at your facility. As we saw with Hurricane Harvey, even facilities that were not directly impacted felt the effects of supply chain disruptions, parts shortages, and even cases where the facility was fine, but employees had no way to get there safely. Risks that sit outside the fence line can stretch from a few days of lost revenue into one or two weeks' worth.

Companies leading the way in improved resilience plans are taking these interdependencies into account. Organizations might consider sharing the costs of protecting a common power source, for example, or the local community might be interested in partnering around green infrastructure solutions. By capitalizing on these partnerships, you may eliminate weaknesses and multiply economic benefits.

A wider perspective focus also helps you dig into vulnerabilities that often go ignored. Reputational risk, for one, is growing in prominence but not always accounted for, even though the consequences of losing the public's trust could outweigh the cost of fines or remediation projects. Risk strategies must look beyond the obvious natural disasters and health and safety risks to protect against all threats to organizational goals – workforce turnover, unhappy stakeholders, malevolent threats, toxic work cultures, and so on. This reveals opportunities to develop multi-faceted solutions and/or add value while reducing risk.

3. Engage and empower the workforce

Staff are equally important in maximizing the value of resilience measures. They are the ones who will have the most experience with threats and can detail how climate-related impacts reduce productivity. Giving them a voice in the process will lead to more effective designs and smoother implementations. Not to mention, it will create a personal stake that breaks resilience out of its silo and embeds it into company culture – turning resilience from a weakness to a competitive edge.

4. Develop an appetite for data

Your best solutions will be created by using accessible, forward-looking data. Models for all types of scenarios – flooding, sea level rise, droughts, fires and other events – can be useful in identifying potential risks. However, there are caveats to keep in mind:

- No model is perfect. Inaccurate results for some locations can be produced due to simplifications and/or assumptions used to create the model. As such, relying on a single model for analysis of risk across multiple sites could create a skewed perspective.
- Models don't always produce engaging outputs. Investing in dashboards that translate complex datasets for operations and business leaders can make it easier to strategize for unexpected events.
- Do not take data at face value. Data that is out of date, even by just a few years, can turn a 1,000-year event into a 100-year event. Take steps to understand how and when the data being fed into models was developed and under what assumptions to ensure you are getting the most accurate results possible.
- Data about your facility matters, too. When we work with a client on managing risk for a facility, we begin with a thorough evaluation of its unique resilience risk and opportunities. A holistic, programmatic approach is the only way to cover all bases and unveil effective opportunities to protect assets and operations.
- Combine forces with financial planning models. Blending the advanced modeling data with the powerful financial modeling tools you already use can help the organization invest with confidence. That way, critical assets will receive immediate protection while leaving room to close other resilience gaps down the line.

About Arcadis

Arcadis is the leading global Design & Consultancy firm for natural and built assets. Applying our deep market sector insights and collective design, consultancy, engineering, project and management services we work in partnership with our clients to deliver exceptional and sustainable outcomes throughout the lifecycle of their natural and built assets. We are 27,000 people, active in over 70 countries that generate $4.2 billion in revenues. We support UN-Habitat with knowledge and expertise to improve the quality of life in rapidly growing cities around the world.

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Related content

For more insights, read our blog series on industrial resilience.

- Beyond the models: Assessing industrial resilience and water risks
- The 5 facets of effective industrial resilience planning
- What industry can learn from Hurricane Harvey
- Seeing industrial flood risks through a new digital lens
- An alternative to gambling on industrial resilience

Contact us

Ketan Maroo
Vice President
Industrial Infrastructure

E ketan.maroo@arcadis.com

Matt DeMarco
Vice President
Clients & Business Develpoment

E matt.demarco@arcadis.com

Seeing is believing

Digital can help help you increase collaboration, clarity and buy-in around your plan:

Flythroughs

Low- to no-cost digital solutions might be a good way to get your feet wet. Something we have found to be powerful in client conversations is 3D flythroughs. It might not be the most detailed view available, but flythroughs can be useful in considering risks outside the fence line and garnering support for investing in digital.

Virtual tours

Instead of poring over maps and design sketches, 360-degree photography and virtual tours allow stakeholders to visit an area to see exactly which critical assets are at risk in various scenarios. The improved accessibility means fewer site visits, increased coordination and greater buy-in for the mitigation strategy.

100% BIM

Incorporating the entire spectrum of structural, architectural, civil, mechanical and electrical components in a 3D model allows you to communicate a strategy, especially for people seeing it for the first time. Plus, you can incorporate conceptual elements like future construction plans. The enhanced collaboration can expedite project approvals and permitting processes.

Digital twins

Digital twins can monitor assets in real-time and use the rich data streams to enhance decision-making. Instead of a static model, you import relevant data and evaluate the effects of potential changes. Simulations like this can be persuasive for funding opportunities, reveal interconnections on a community-wide scale, and use real-time monitoring to track and act on changing conditions in the real world.

Conclusion

Our survey results confirm that most of the industry is experiencing the effects of climate-related impacts on their facilities, and these risks aren't going away. To protect your facilities, it's imperative to identify your vulnerabilities and invest in tools that can help you defend against them. These digital solutions, for example, hold great value for resilience planning. As you adopt these and other solutions, remember to be patient and leave room to grow along the way. Your organization's first step may be as simple as digitizing documents, processes and assets – it is okay to start small. Building resilience is an ongoing process, and you'll have years of transformation ahead. Lastly, remember that part of being resilient means constantly evolving, so leave room to apply lessons learned along your journey as you move from one phase to the next.

Arcadis. Improving quality of life