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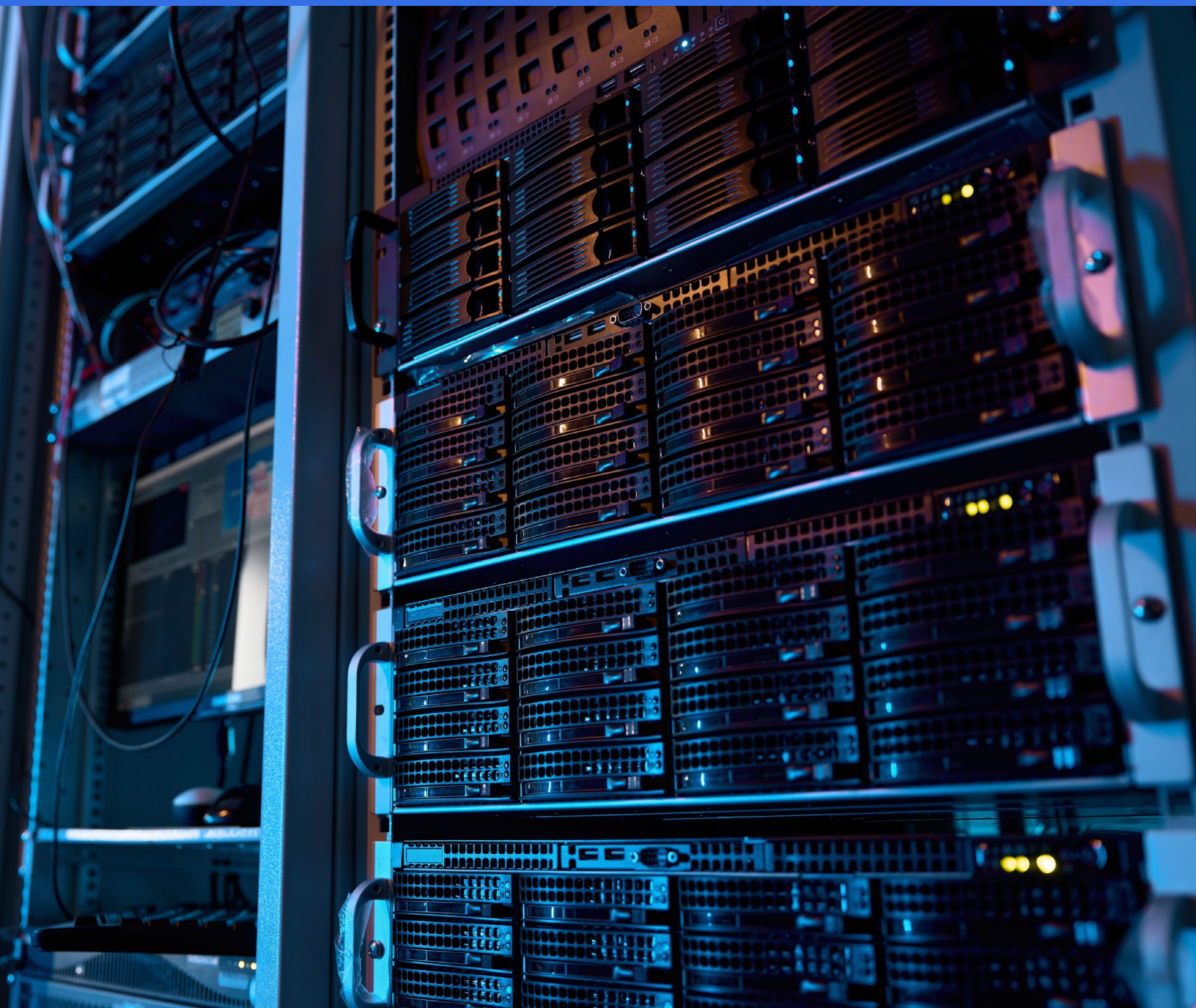
Disasters, Devices, and Direct Current:

A Future Outlook for Backup Power for Data Center Disaster Recovery Planning

A Rehlko *Special Report*



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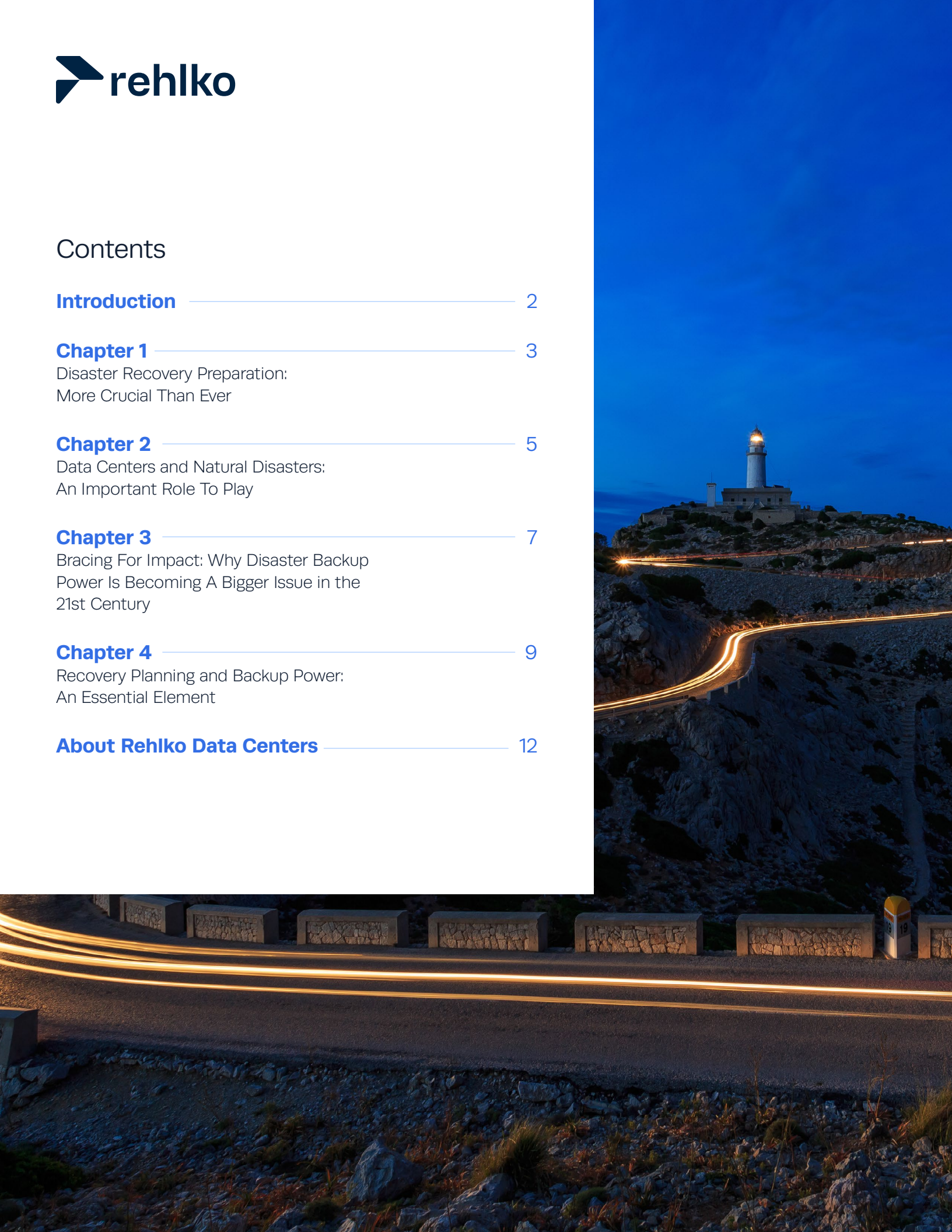

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Introduction

Disaster recovery. It's a standard term and a familiar concept for all data centers. When it comes to disaster recovery (DR) plans, all data centers have them, and — since application uptime and network security are the name of the game — their importance goes without saying. DR is all about enabling a data center to regain its technology and operations as soon as possible after a major failure strikes. It's part business continuity, part security planning, part organizational goals, all important. However, that's not to say that all DR plans are solid. Many data centers coast by with outdated and insufficient DR plans. Some studies show that as many as a quarter of all DR plans go altogether untested. So, while DR efforts might seem like a foregone conclusion, their ability to pull through may not be. and networks come together to create world-class service for data centers everywhere.

As we stand on the cusp of what is known as the fourth industrial revolution, both technology and business practices are evolving at a faster rate than ever. The digital age moves quickly, even for those in the tech industry who are supposed to be the experts. For DR planning it's not just a matter of cracks and gaps that can emerge over time: it's a matter of a whole new ballgame emerging under your nose.

The purpose of this report is to discuss that ballgame from a thousand feet, and from the unique perspective of backup power. Instead of diving into the nitty gritty of power systems and equipment specs, let's look at the issue from a larger scope – the future of disaster recovery for data centers writ large, and how backup power systems fit into that picture.

This report aims to cover four main questions:

- Why is the importance of DR preparation growing for all businesses?
- Why are there extra responsibilities on data centers more than other businesses to perform during times of disaster?
- Why is the risk of power loss during a disaster higher than ever?
- How can data centers ensure optimal backup power is built in as an essential part of their DR planning?

We hope this report will provide context and insight to see the larger trends in disaster recovery emerging so you can feel knowledgeable and prepared for the data center world of tomorrow — empowered, you might say.

Chapter 1

Disaster Recovery Preparation: More Crucial Than Ever

When we try to look into a crystal ball, we're hoping to see good things – a bright future, a better way forward, a new opportunity. But what happens when the news from the crystal ball isn't so rosy?

Uptime hazards are on the rise for all businesses in the IT sector. Risks and threats of different shapes and sizes are growing, and the ability to avoid disaster is increasingly beyond the control of business leaders. For data centers, though, the increased danger simply means a heightened emphasis on disaster recovery preparation. Even as variables become thornier, the ability to fashion an optimal response remains in control. Let's take a look at the threats facing data centers and why it means they should respond with extra effort toward disaster planning.

Disaster Risk On The Rise

To begin, natural disasters are becoming more common, and less predictable. The number of disasters reported have increased five-fold over the past five decades, and 10-fold over the past 100 years, with storms like hurricanes and blizzards constituting 30% of all natural disasters — a pertinent threat for all data centers. Not only is extreme weather on the rise, but there is also evidence to show that the severity of these events is increasing.

To make matters more complicated, technological advancement is creating a scenario with many more unknowns, and an increase in failures are inevitable. In reference to digital transformation and tech innovation, engineering veteran and industry consultant Ishaq Mian put it this way: "For economic development globally, it's going to be great, but that great achievement comes with certain risks. Today we're integrating information and communication technology with the traditional industrial system and that is creating interdependencies and complexities that we don't understand yet".

For Mian, the chasm of unknowns is large. "I have a doctorate in the field and I'll tell you I don't fully understand when it comes to integrating ICT with the energy infrastructure", says Mian. "If anyone out there is claiming that they understand all the interdependencies that are being created as we integrate ICT with the power system, I say they're lying."

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>
> **Ishaq Mian**

Failing To Plan Is Planning To Fail

So far, the future of outage risks represents a bleak picture. It doesn't need to be all doom and gloom, though. Yes, failures are eventually going to take place, likely in increasingly regular and harsh ways — but proper planning can reduce the duration and severity of any negative event. When a disaster strikes, it's too late to consider your response, but being prepared for recovery is a choice. It all comes down to forward thinking that can reduce damage or disruption in the face of system failure. Perhaps, proper planning can even mean no recovery is necessary at all.

That's certainly the opinion of Gil Santaliz, CEO of data center and subsea cable landing station NJFX. When speaking about disaster recovery, he defines resiliency as the elimination of a recovery period. "If I do a good enough job in building a system that's resilient, my customer won't feel any kind of issue for a quote-unquote recovery", says Santaliz, "It's all in the planning. We call it blue sky planning. If you build it right, you prepare, and you have methods and procedures when you do any kind of changes you really are providing a resilience where you don't have to have a recovery".

When failure inevitably hits, those that just started thinking about how to respond to the crisis are too late. As the ability to avoid failures becomes less and less realistic, preventative measures become more and more important. You may not be happy with what the crystal ball is showing, but the reality won't hit as hard when you have the power to prepare for it.

Chapter 2

Data Centers and *Natural Disasters*: An Important Role To Play

The general need for functional IT in the event of a disaster is growing, placing extra pressure on data centers. Data centers have a self-interest in ensuring their own resiliency, but they also have a responsibility to serve their communities with vital services when they're needed most. With the importance of networking technology in disaster response comes the importance of backup power to sustain it.

Serving Big and Small

During the period between 2000 and 2019, the United Nations recorded over 7,000 significant natural disasters that claimed over a million lives. In the days of social media and mobile apps, data centers can serve the civilians directly affected by the disaster. During the 9/11 attacks of 2001, only around 5% of information about the event was delivered by mobile phone, computer, or tablet. By the Boston Marathon bombing 11 years later, however, that number jumped to 30%. In the present day, that number is dramatically higher still. More than ever, distressed, endangered, and displaced people depend on data center-powered technology to reach out for help.

Data centers can provide support in much larger ways, too. Significant natural disaster situations require considerable collaboration between many government and non-government agencies and organizations to provide relief and support. Communication platforms like email, instant messaging, or videoconferencing can be just as vital as sandbags or window shutters in some situations. In this light, computing and communications technology become an integral support of a successful disaster response.

Networks In Action

A great example of how optimal relief efforts depend on communication networks can be found in the 2011 tsunami that struck the coast of Japan. The disaster eliminated computers, communication lines, and servers. In the aftermath of the event, a lack of information meant relief teams didn't know where resources like radiation cleanups should be delivered. Relief came in the form of badly-needed cloud services, enabling staff and volunteers to address needs more quickly and effectively. In short, a lack of IT infrastructure left relief efforts blind, unable to convey, collect, or distribute information about supplies or conditions. Additional cloud infrastructure also supported local governments whose servers were not taken out by the tsunami, but taken out by a deluge of traffic—people around the disaster looking for information. In the end, IT infrastructure and communication networks proved a vital part of the relief effort.

This idea isn't a new one. Big industry players like Cisco, IBM, Google, and Microsoft all recognize the important part they must play, devising special programs to lend servers, data centers, custom software, and technical expertise in times of need. It's about supporting relief organizations by delivering the backing that their technological tools run on for their crucial work.

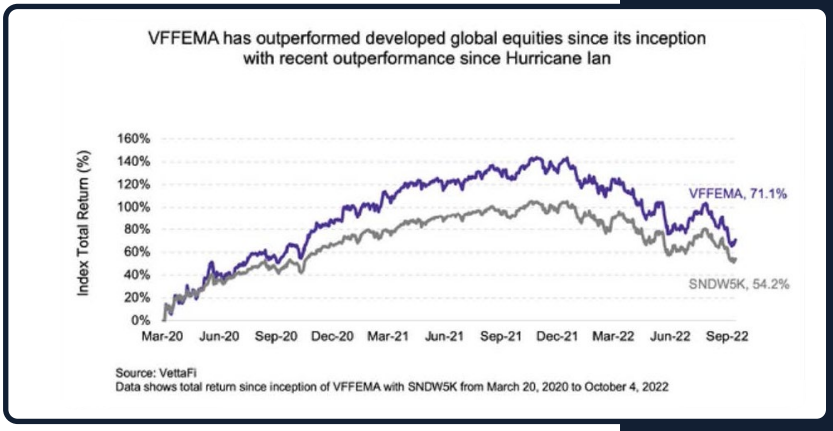
In the future, disaster relief will be even more technological in nature. Research into Artificial Intelligence (AI), for example, has the ability to completely overhaul the operations of emergency response.

Machine learning applied to policy and programs has already begun to transform crisis response and recovery in optimistic ways. IoT devices and 5G networks bring even more exciting possibilities.

Powering The Response

Underneath the technology that can save lives, backup power is central to the effort. For example, in efforts to rebuild Haiti after a deadly 2010 earthquake, acquiring backup generators and emergency satellites was a top priority — precisely because they enable communication networks to subsist. The goal is for Haitian government agencies to curb their network downtime to five minutes or less in the next crisis.

And it's not just Haiti. The VettaFi Natural Disaster Recovery and Mitigation Index has identified an increasing dependence on backup power in connection with communication technology. Looking ahead to the next big disaster, technology requires reliable access to power, so an increasing dependence on technology brings with it a heightened emphasis on backup power generation.



When disaster relief teams improve their capacity for things like temporary housing or emergency transportation, an increased capacity for communications and IT systems comes hand-in-hand. As data centers secure backup power supplies to ensure their operations can continue even in the midst of disaster, they will play a larger and larger role in the recovery efforts of the communities they serve. Just as data centers are becoming more important in disaster response because of an increased dependence on technology, so too is emergency backup power becoming more important because of those data centers.

Chapter 3

Bracing For Impact: Why Disaster Backup Power Is Becoming A Bigger Issue in the 21st Century

All data centers are at risk of power loss. When it comes to business continuity, they can do everything right in-house but still be at the mercy of a larger system that's out of their control. A closer look at the resilience of power grids and the power supply recovery strategies shows that data centers should be worried about future electrical failures, and place a heightened emphasis on backup power.

Large Scale Infrastructure In Question

Recently, residents in places like California and Texas have been called on to cut back their power usage in the face of blackout fears. It's a wakeup call for the very real threat of power outages — a threat that will continue to grow. Weather-related power outages have doubled over the last 20 years, with the average American experiencing more than eight hours without electricity last year. Not only are outages becoming more widespread, they're also getting longer: both frequency and length of power failures are both at their highest since tracking such occurrences began. Although we depend on them immensely, power grids are not simply not resilient in the event of an emergency. Alarmingly, things will get worse before they get better. Power systems will always be vulnerable to severe weather events like heat waves, snowstorms, forest fires, and floods — events that are increasing in frequency and severity.

It's not only natural disasters that put electricity grids at risk, either. Cascading failures and blackouts can be the result of overload, transmission line outage, or bus-bar breakage, not to mention computer hardware, software, or data-related failures. The trend toward electrifying more everyday processes such as car fueling and home heating means the demand for power system functions to perform is going up, and many grids are not prepared to handle the added stress. Worryingly, the country's grid and power transmission facilities are decades old, and in many areas haven't been updated in over 50 years. Despite it being so vital for supplying electricity to homes and businesses, power infrastructure is out of date and badly needs refurbishing.

There are several ways to increase the hardiness of the system. For instance, sturdier power poles, better transmission equipment, redesigned grids, and distributed generation systems all represent helpful ways forward. However, implementing such solutions is very complex, and requires an immediate prioritization of infrastructure investment that doesn't currently exist. Until that time, grid reliability that is already shaky will continue to decrease.

> *"Investing in redundant IT infrastructure is your best bet to weathering any storm or unexpected crisis."*
>
> **JP Laqueur, Databank Senior Vice President**

Not only is grid reliability on the decline, but the ability for private or public organizations to recover quickly in the event of a failure is also questionable. Electrical infrastructure failures are complex, often affecting large regions and interdependent with other infrastructure sectors like financial, communications, and healthcare systems. Responding to a major event frequently requires federal, regional, state, and municipal level collaboration to recover. In the face of a widespread power outage, current resources required to manage a response are woefully inadequate. According to the National Infrastructure Advisory Council, a catastrophic outage that leaves significant parts of the country without power for weeks or even months is a very real possibility.

Fortifying Outage Defenses

In light of an increasingly vulnerable access to electricity, backup power represents a central need requiring special attention for data centers.

Part of that importance derives from electricity's crucial, core role in day-to-day business and social functions. Another part of the reason to focus on electricity is because resiliency efforts can be so effective. By concentrating efforts on power resiliency planning, one study showed that an individual business can reduce the operational effect of a power outage by as much as 86%.

A great example of planning in action can be found in the devastating winter storm that struck Texas in February 2021. DataBank, an operator of eight data centers in the area, was hit hard. Even as those around them went without power for days, their commitment to disaster preparation reaped major rewards: "We were able to keep all of our data centers online because of the investment we made in backup generators and protocols, specifically to prepare for this magnitude of disaster," explains Databank Senior Vice President JP Laqueur, "Investing in redundant IT infrastructure is your best bet to weathering any storm or unexpected crisis."

The burden induced on already-weakening power grid operations is on the rise, and the increasing threat of a sustained power outage should be on the radar of any data center leader. By taking backup power measures into their own hands, data centers can buttress their operations by ensuring their facility is an electricity stronghold even in times of trouble.

Chapter 4

Recovery Planning and *Backup Power:* An Essential Element

All data centers are at risk of power loss. When it comes to business continuity, they can do everything right in-house but still be at the mercy of a larger system that's out of their control. A closer look at the resilience of power grids and the power supply recovery strategies shows that data centers should be worried about future electrical failures, and place a heightened emphasis on backup power.

So far we've seen why we should expect to see disaster events more often, why power loss is a particularly high risk, and why data centers will be counted on more than ever during such events. So, what can be done? How should data centers approach their DR planning to ensure backup power initiatives are as robust and effective as possible?

A Backup Plan, A Plan For Backup

With the goal of a formal document for all to follow in times of crisis, creating a comprehensive DR plan is a tall order. There's setting goals, delegating personnel, and outlining steps. There are diagrams, templates, contact lists, and software. There's vendors, insurance, media, clients, and lawyers. With all this going on, it's tempting for data center leaders to deprioritize a topic like backup generators on the backburner — a dire error that can be avoided by prioritizing a process-based mindset.

In all the many DR components and considerations, it can be easy to fall into a common pitfall: jumping into the planning and testing of a DR playbook without performing proper preparatory analysis. The first step of DR best practice should always be assessment, and it's this initial stage of the planning process that can make or break a DR plan. Assessment is also where backup power shines through as a foundational DR element, integrally related to all other aspects of a rock-solid DR plan.

Backup Power and BIA

Of course, not all initial DR assessments are the same. There are many different approaches and ways of thinking. However, regardless of analysis style, all plans lead back to the importance of backup power. Let's look at one prominent example: business impact analysis (BIA). In BIA, organizations take inventory of all assets and services, then examine the impact different types of incidents would bring to each. This examination includes both financial costs and non-financial losses like reputation, safety, legal compliance, or regulatory penalties.

Often, BIA discussions center around how long a certain service or asset can be down before losses occur. From the perspective of backup power, this type of DR evaluation shows just how pervasive the need for backup power truly is. As data center organizations pore over their assets — hardware, software, networks, virtual machines, security services, SaaS services, and more — each individual asset requires electricity to function. So, regardless of the final result of the BIA process, backup power will be a top priority for each and every asset regardless of risk or loss evaluation.

Backup Power and Risk Analysis

Another common practice in DR analysis is using a risk analysis approach. This route assesses potential threats and the technical vulnerabilities each threat poses. These vulnerabilities are then used to guide the creation of procedures later in the DR planning process. Notably, this approach involves looking beyond IT infrastructure and customer-facing services to the physical facility itself with components like heating, cooling, fire safety, and physical security. Many of the elements involved in risk analysis tie directly back to the importance of backup power in DR planning.

For starters, there's the idea of prioritizing some functions over others. Because downtime is more tolerable for some applications and activities,

identifying critical operations that are so essential to operations that the business cannot survive without them. Steady, reliable power will always be identified as a critical function regardless of organization or situation. As for critical applications, those can be traced back to backup power using another risk analysis concept: interdependencies. Smart planners will document dependencies in the analysis stage of DR planning, creating a map for understanding which business functions are affected by others if they go down. Knowing which affected business entities depend on each other is vital information, and every single one of them will depend on electricity. In other words, backup power is the ultimate dependency on a DR roadmap.

Another common concept in the DR assessment stage is single point of failure (SPOF). SPOFs represent the largest risks for DR, and mitigating them should be a high priority. When identifying SPOFs, backup power is an elephant in the room and a towering problem to be solved. All power coming from a single substation is a glaring SPOF, as is a dual power feed that meets at a single transformer. Even in the case of multiple feeds from multiple substations entering multiple transformers, they may all use a single power conditioner, resulting in a high-risk SPOF. Ascertaining SPOFs is crucial, and power is the granddaddy of all SPOFs.

Putting It All Together

In the many, complicated parts involved with planning for a disaster, thorough assessment should be the first step. Good strategy is built on good analysis, after all. In the assessment stage practices of inventorying resources, deciding which are essential, and how they can be protected, backup power emerges as integral, interwoven in most functions and processes. Whether talking about prioritizing applications, dependencies, SPOFs, or even affected entities, facility risks, and recovery mechanisms, all signs lead to backup power as an indispensable factor in any DR plan. When preparing for the worst, data centers should think of power first.

Add Power to Your Backup Plan with Rehlko

Rehlko is committed to giving data center operators peace of mind, so that when the unplanned occurs, they can rest assured knowing their data center will continue to provide the critical services we've all come to rely on. Our generators are designed with thousands of hours of field testing, meaning that we've planned for the unplanned so you can keep the lights on.

Uptime and Reliability

We design power systems that meet the requirements to minimize and eliminate downtime. Getting the right combination of uninterrupted power supply and generators to meet tier classifications is our expertise.

Redundancy

Our power systems are fully capable of paralleling two or more generators with paralleling switchgear to provide redundancy solutions.

Scalability

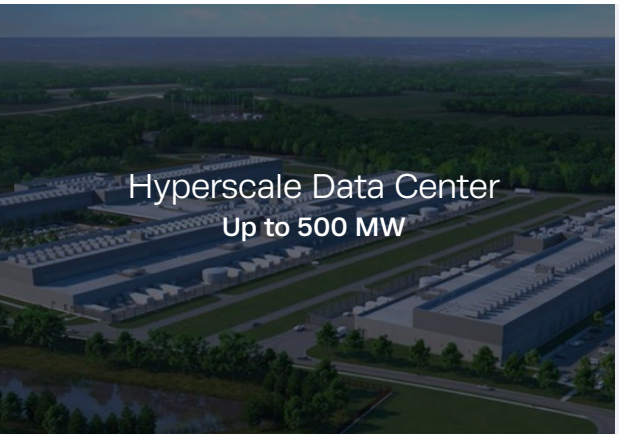
We help businesses achieve cost savings and efficiency by delivering dependable and scalable power systems capable of delivering current needs and future expansions, and meeting demanding operational requirements.

24/7 Service & Support

Take worry and anxiety off your mind and keep your focus on your business. A single call to us assures you of expert support and problem resolution day or night.

The Right Generator for Your Needs

No matter if you're operating a hyperscale generator of up to 500 MW or a smaller edge data center, Rehlko has the right reliable sources of backup power for you.



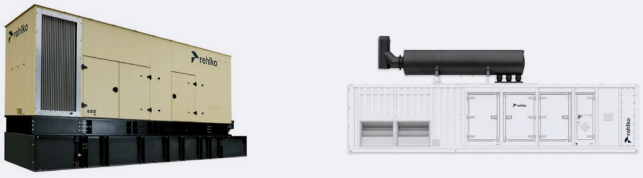
Density Pods

Best power density on the market

45' Container | Walk-in Enclosure | eFRAME

Modular Pods

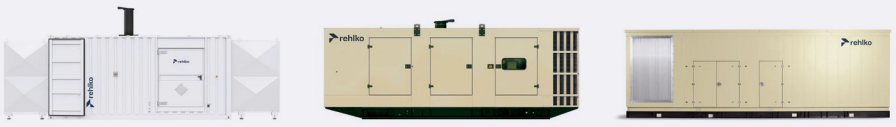
Quick deployment



40' Container | Skin-tight | Stackable, Retractable

X-Press Pods

Short lead time



20' Container | Canopy | Skin-tight

About Rehlko

Rehlko stands as a global leader in energy resilience, known for providing backup power essential to data centers uptime. Our solutions empower mission-critical facilities organizations all over the world, enabling a brighter, sustainable future together.

For over a century, Rehlko (formerly Kohler Energy) has met today's energy needs with reliability and foresight, preparing for tomorrow's challenges. As we look to the future, our mission aligns with global priorities: to ensure stability through reliable energy sources and resilient backup systems. At Rehlko, our commitment to innovation is unwavering; we don't just deliver energy solutions – we're helping create an energy-resilient world for a better tomorrow.

Strength, Excellence, and Sustainability: Power Solutions for Every Need

Our robust range of power solutions spans combustion, hybrid, and electrification, built for both indoor and outdoor applications. At Rehlko, we focus on strength and sustainability to get tough jobs done efficiently and responsibly. Through ongoing innovation, we aim to reduce environmental impact while delivering energy resilience.

Integrated Solutions to Keep Your Business Ecosystem Powered

Rehlko's responsive, integrated power systems, including top-tier generators and uninterruptible power systems, ensure that critical facilities like data centers remain operational and worry-free. Our combination of global expertise and localized support means businesses can rely on consistent power solutions tailored to meet unique demands.

Innovation Driven by Insight and Foresight

By leveraging cutting-edge technology and a mission-centered approach, we're constantly exploring solutions to today's energy challenges that anticipate tomorrow's needs. With the aim of sustaining and improving life, Rehlko's teams are dedicated to pushing boundaries toward a sustainable future that's as resilient as it is promising.

To learn more, visit Rehlko.com

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