

Consumer Electronics Leader Ensures Reliability of High-Criticality Data Center Using No Backup Generators



A Vertiv Case Study



Background

The electronics and computing industries are today's leaders in enabling digitization of both society and the global economy. The technologies and products developed and manufactured within these two industrial sectors radically alter how data is being captured, distributed and consumed.

Consumers across the globe benefit by using devices such as smart phones, tablets, and laptop computers to access content that serves as their primary means of business and personal communications, as well as for entertainment and education. Over the last decade, products from the electronics and computing industries have become widespread and have influenced how humans across the planet work and play.

One of the leading manufacturers in this sector has embraced the mission of modernizing internal operations while promoting high levels of both sustainability and circularity. One example is the way the company is expanding its internal data center infrastructure to support current and future online internet services.

The newly commissioned data centers are among some of the largest and will use 100% renewable energy to power operations. Hyperscale data centers have grown steadily since 2017, with many cloud campuses exceeding 1 million square feet of space and 100 megawatts of capacity. That's a sign of the booming internet economy, which has played an even larger role in daily life since the beginning of the COVID-19 pandemic. The company relies on its data center infrastructure to support applications and interfaces to address the requirements of its core customers.

In Europe, the company's critical data center is located next to the host country's largest electrical substation. With four different providers feeding energy to the data center, this location eliminates the need for using carbon dioxide-emitting diesel or gas

Challenge:

Ensure the internet applications for a leading tech company specializing in consumer electronics stays up and running in an environment with no backup generators

Solution:

E+I Engineering's power distribution and control system (PDCS) and electrical power management system (EPMS)

Results:

- Zero downtime since the solution was installed
- Easy access to dashboards that reveal power system performance in granular detail
- Self-healing data center power distribution network
- Reduced energy consumption and low carbon emissions

generators as power backup sources. Locally, the data center uses both solar arrays and two of the world's largest onshore wind turbines to power the company's data center, with excess energy being fed back to the nation's grid. In addition, the facility is designed to capture excess heat generated by the IT server equipment inside the data center and channel that heat to a local distribution system to help warm homes in the neighboring community. The company's goal is to become carbon neutral across its supply chain by 2030.

Challenge

The complexity of the power network requires sophisticated management tools

The company has committed to work with partners to achieve energy consumption and sustainability targets. One of those partners, the Vertiv company, E+I Engineering Group, was brought on board to help the data center management team implement the software and automation needed to better control and monitor data center power flows.

Data centers require a high level of electrical reliability, and uninterrupted availability continues to be a significant concern for data center managers. Instability in the data center electrical supply is expensive and can damage the data center owner's reputation, especially when millions of internet users depend on the online services that the company provides on a daily basis.

Some of the most common power issues that data centers experience include:

- **Voltage sags, swells, and spikes** - Brief decreases or increases of the voltage at the power frequency beyond the normal level.
- **Harmonic distortion** - This occurs when the voltage or current waveform is altered from a sinusoidal shape. It is common to non-linear loads, such as the types of electronics and processing equipment in data centers.
- **Interruptions and outages** - Complete breaks in the supply of power that can last a few seconds or much longer. Causes can range from lightning and storms to faulty wiring or installation of equipment.

Such issues include flickering lights, overheated equipment, circuit board failure, data processing errors and losses, reduced productivity, unexpected shutdowns, and complete service outages. The Electric Power Research Institute (EPRI) has determined that U.S. businesses alone lose between \$119 billion and \$188 billion per year because of power issues.

And, according to the EPRI, 80% of power problems are caused by equipment and processes within the end user's facility, not by the commercial electricity provider.

The power coming into the facility must also be used efficiently, so that waste and CO2 emissions are kept to a minimum. To control data center efficiency, accurate data power consumption measurement and analysis tools are required.

To avoid the issues of power waste and network instability, the data center's engineering team decided to turn to the electrical network experts E+I Engineering.

Solution

High precision monitoring and power systems automation drive reliability

The electrical networks that support critical enterprise data centers are complex. If a part of the network is incorrectly configured or managed, data center downtime risks increase. When the E+I Engineering team was asked to provide a solution, the software and power network automation tools they proposed were focused on addressing two data center needs: power management and power monitoring and analysis.

Since the data center owners chose not to use diesel or gas generators as a form of backup, the four separate utility feeds had to be closely managed with a power network flexible enough to automatically share, synchronize, and reinstate loads.

The E+I Engineering experts used programmable logic controllers (PLCs) to enable automatic changes to the network when needed to safeguard uptime. If a fault occurs in the electrical network, the network reconfigures itself to resupply the components affected by the fault prior to any downtime occurring. Very little human interaction is required because of the built-in system redundancies.

To monitor the data center's power network, the E+I Engineering experts designed and installed an EPMS interface which visually illustrates incoming power supplied from the substation transformers and tracks power behaviors across the entire data center power network. The visualizations include illustrations of the main medium-voltage switchboards and display whether the breakers are in a closed or open position.

The E+I Engineering experts also developed custom dashboards and reports that track energy consumption for each particular data hall. The information enables the data center operators to pinpoint inefficiencies within the network and make adjustments to improve efficiency.

The dashboards illustrate current loads and even divide those loads into IT loads and mechanical equipment loads (loads generated by cooling and power conditioning equipment). Reports also include meter and sensor information trending, as well as up-to-the minute power usage effectiveness (PUE) readings.

Results

High levels of expert power systems support keep systems up and running

The deployment of the E+I Engineering's PDCS has resulted in higher uptime and lower energy consumption for the company's critical European data center. Since the deployment of the new solutions, the data center has operated without any incidents of unplanned downtime. The users have also experienced a number of additional benefits:

- **Predictability of power network behavior** – Since the software allows operators to view power operations across the entire breadth of the data center with high precision, overall power quality is better managed. Operators can see all the critical parameters within the switchboards in real time and can predict any potential issues by monitoring the network's behavior. If signs of a potential power anomaly begin to appear, the system automatically tracks the situation and rectifies the issue before any damage or trips occur, while also keeping the operator aware of what's happening at each step.
- **Flexibility of power information access** – The data center operators can access the EPMS screens either remotely or from their multiple 65-inch, on-site control room monitors. Any critical level alarms are automatically emailed and/or texted to operators and data center management executives running this site, indicating actions that need to be taken to address the situation.
- **Multi-level ongoing support** – Through an in-depth maintenance and support agreement, the E+I Engineering team assists the data center operations and facilities teams as trusted advisors. Support teams create dashboards, deliver custom reports, and monitor alarms across multiple areas of the data center. Alarms are fed back into a central database that the E+I Engineering team monitors on a 24x7 basis, making sure that any issues or errors are quickly resolved either remotely or on-site the next day if needed.

Moving forward

The company has been pleased with how the E+I Engineering PDCS and EPMS has performed in the first phase of their data center project. Now the company aims to standardize not only on the power automation and power management system, but also on Vertiv medium-voltage (MV) and low-voltage (LV) solutions along with busbar, uninterruptible power supplies (UPS), and static transfer switches (STS) across its global data center sites.

"For this critical facility, our customer wanted a robust control system in conjunction with an electrical power management system — a fully integrated solution across all functional areas within the data center. And through close collaboration, we were able to realize that vision. We met all the customer objectives and more and continue to be their trusted advisors regarding the company's fleet of data centers located around the globe."

- Simon Killen, Group Manager - EMS & IT,
E+I Engineering

Go online to learn more about how [Vertiv data center solutions](#) and [E+I Engineering](#) can enhance power management and improve systems uptime.