SUSTAINABILITY AND THE GREEN DATA CENTER

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Sustainability has become an essential criterion by which a company is judged by its customers, workforce, government and even its investors. As this eBook will explore, now is the time for the data center industry to elevate its environmental stewardship with energy-efficient infrastructure and renewable power resources. We'll also learn about eStruxture's commitment to powering its data centers with a more sustainable solution, all while maintaining a high level of performance, scalability and uptime.

THE DATA CENTER AS A CHANGE AGENT FOR SUSTAINABILITY

According to the management consulting firm, McKinsey & Company, data centers worldwide consume approximately 30 billion watts of electricity — the equivalent output of 30 nuclear power plants — or enough to power all of the households in Italy, a country with a population of nearly 60 million people. In fact, carbon dioxide emissions from data centers now equal to those of the air travel industry.

Given IDC's prediction that the world's data traffic will surge 61 percent from 33 zettabytes (ZB) in 2019 to 175 ZB by 2025, it's self-evident that our reliance upon data centers will only increase as the global economy becomes further digitalized across both mature and emerging markets. And while much of the business world's focus on sustainability has been motivated by regulatory policies and tax incentives that encourage the use of renewable sources such as solar, wind and hydropower that don't produce greenhouse gases which contribute to global warming, the majority of the growth in renewable energy is being dictated by market forces. Consumers across a broad range of industries are now pressuring organizations to become more responsible stewards of the environment.

In 2019, the top four users of renewable energy in the world were Google, Amazon, Microsoft and Apple, according to Bloomberg New Energy Finance. However, corporate giants, not just Big Tech, are now buying into green energy too. Goldman Sachs targeted the use of 100 percent renewable power to meet its global electricity needs by 2020. Walmart, the world's largest retail, has announced its plans to secure 50 percent of its energy from renewable sources by 2025. And carmaker General Motors has plans to become thoroughly green by 2050.

> *"It comes down to doing the right thing. As major power consumers, the data center industry has a responsibility to do everything we can to drive efficiencies and protect the environment."*
> **-James Beer, Senior Vice President-Operations, eStruxture**

Recently, a group of large technology companies led by Salesforce formed a new alliance called the Step Up Coalition, which is dedicated to harnessing the technologies of the Fourth Industrial Revolution to help reduce greenhouse gas emissions across all economic sectors. Not surprisingly, accelerating organizations' transition to 100 percent renewable energy, making energy-efficiency improvements across global building portfolios, and eliminating wasteful cooling in data centers and telecom facilities are major initiatives of the alliance's platform.

Moreover, a new study published by the academic journal Science and titled *"Recalibrating global data center energy-use estimates"* shows that commercially operated data centers are becoming increasingly more optimized for efficiency. Cooling and power systems are so much more efficient than before, that the decrease in their energy use is enough to mostly offset the growth in total IT device energy use.

So, let's take a deep dive into the data center, and how and where green infrastructure can make a difference in achieving energy efficiency and sustainability for the benefit of enterprise stakeholders, their customers and our planet.

ENERGY AND UTILIZATION CHALLENGES

A thorough analysis on the climate impact of the data center should consider energy efficiency and resource utilization, in addition to power mix. Carbon emissions in the data center are influenced by three major factors:

- The number of servers running
- The total energy required to power each server
- The carbon intensity of energy sources used to power these servers

While large cloud service providers tend to operate their data centers very efficiently, the same cannot be said of other types of computing environments, including many colocation facilities. Very frequently, servers are being used inefficiently, consuming power twenty-four hours per day, 365 days of the year, while doing little work most of the time. According to the Natural Resources Defense Council (NRDC), the average server operates at no more than 12 to 18 percent of its capacity while still drawing 30 to 60 percent of maximum power.
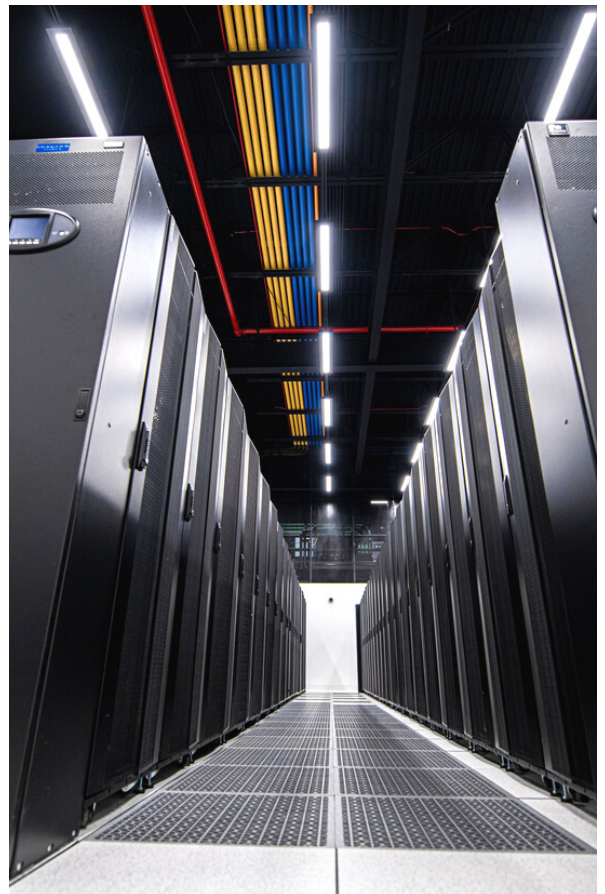
Peak provisioning is a common default mode whereby data center operators install enough equipment to handle peak annual load, but do not power down unused equipment during the majority of the time when it's not needed. Additionally, a low deployment of virtualization technology, which allows the consolidation of workloads onto fewer servers across an entire server fleet, further contributes to energy inefficiency.

Many data centers and colo facilities are haunted by "ghost servers," meaning idle or underutilized servers that can draw as much as half the power used during peak workloads. According to a study by Intel®, 10 to 15 percent of servers can fall into this category at any time. Once again, this wastes energy as well as space when these servers can be virtualized, and their workloads consolidated.

Lastly, there is the problem of ineffective cooling or insufficient cooling capacity. Cooling alone can account for 30 to 40 percent of the power costs for the data center. Another issue is that the cooling systems used in many older data centers date back to an era of significantly lower power densities. As a result, these legacy facilities often struggle to accommodate the intense heat generated by today's high-density, power-hungry IT equipment. In other cases, some data centers do have sufficient cooling capacity, but they are unable to distribute it where needed, or the facility may not be operating at the capacity for which it was originally designed. The common response then is to resort to overcooling, expending precious electrical energy and expanding the data center's carbon footprint, instead of stabilizing cooling at a comfortable, even temperature.

"Our engineers work to design and develop the most energy-efficient data center possible." -Todd Coleman, President & CEO, eStruxture

ESTRUXTURE AND THE SUSTAINABLE DATA CENTER

Now that we've taken a look at the challenges of running energy-efficient infrastructure, let's examine the eStruxture sustainable data center solution.

Faced with the proliferation of Big Data analytics, the increasing adoption of emerging technologies such as Artificial Intelligence (AI) and machine learning applications, and the continuing onslaught of data that will only increase with the mainstreaming of Internet of Things (IoT) devices, colocation in Canada, and specifically Montreal, Quebec, has become a go-to option for enterprises running these types of high-density computing environments. Businesses in energy, financial services, government, media and entertainment, retail and healthcare, as well as hyperscalers including large cloud service providers (CSPs) are reaping the benefits of colocation in Montreal, which begin with the region's climate and the accessibility of clean, renewable power.

Given its long winters and temperate summers, maintaining proper server temperature is easier and more affordable in colocation facilities such as eStruxture's Montreal-based facilities. The cool Canadian climate in turn naturally cools infrastructure, thereby reducing the demand for excess power and lowering operating expenses.

For example, the utilization of "free cooling" is available up to eight months per year at several of eStruxture's facilities, which are designed to achieve a power usage effectiveness (PUE) rating of sub-1.2 at full load. A traditional data center has a total energy expenditure for cooling alone at 50 percent of critical IT load, and frequently significantly higher. In contrast, eStruxture is able to achieve an annual average power saving of 70 percent through the use of airflow management techniques such as hot and cold aisle containment, computational fluid dynamics (CFD) analysis and air-side economizers, allowing the facility to further benefit from the outside ambient temperatures. The combination of free cooling and chillers that use the latest in compressor technology also enables eStruxture to minimize water consumption.

In light of hyperscale and enterprise customers' increasingly ambitious environmental responsibility objectives, another major advantage of colocating in eStruxture's Montreal facilities is that nearly 100 percent of the energy generated by the local utility, Hydro-Quebec, comes from hydroelectricity. Hydropower is an affordable, abundant and clean form of energy that produces greenhouse gas emissions that are 50 times lower than natural gas, five times lower than solar power and about equal to wind power. Moreover, Quebec's power grid, one of the largest, most reliable and self-reliant systems in the world, provides stable electricity rates that are unaffected by fluctuating oil prices.

eStruxture also virtualizes its own server, network and compute infrastructure whenever possible, consolidating workloads, and optimizing power, cooling and space, and in the process, minimizing the carbon footprint of its facilities. Asset management is focused on high utilization, with no idling infrastructure present across its data centers, eliminating wasted energy expenditures. Colocating in eStruxture's Montreal facilities also avails customers to Quebec's provincial economic incentives, including favorable capital cost allowance rates for purchasing clean energy equipment.

By sustainably designing and upgrading its facilities, using clean hydropower energy, and carefully selecting eco-responsible technologies and suppliers, eStruxture is committed to increasing its power usage effectiveness — all while maintaining a high level of performance, scalability and uptime — and offering the most flexible data center solutions to its customers.

All of eStruxture's facilities, including those in Toronto, Vancouver, and Calgary, have been designed with the same focus on sustainability.

"We strongly believe that being green is not only good for the environment but good for our customers, as well."
-Strahan McCarten, Senior Vice President, Product and Strategy

To learn more about eStruxture's data centers and to schedule tours of its Montreal, Toronto, Vancouver, or Calgary facilities, contact us via:

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