GREEN CLOUD COMPUTING

## **Green Cloud Computing Definition**

Green cloud computing is a coined term that means making the practices and approaches of using technological advances like computing and other IT resources sustainable for potential environmental benefits.

The growing number of companies around the world makes a significant impact on the environment. This growth means for a great need to use data centers, an increase in the daily commute of workers, and an influx of office materials and supplies needed on a daily bases. Green cloud computing answers these looming environment issues by providing options that can lower emitted carbon footprints around the world.

Many companies are now leaning on the cloud services as such many technological applications and practices that can reduce environmental impacts are being developed daily. Green cloud computing makes it possible to maintain and enhance business operations and processes while looking after the environment.

### ****Impacts of Green Cloud Computing To The Environment****

1. **Fewer Carbon Footprints Because Of Remote Workers**

Cloud computing allows businesses to store their data on the internet, which means it can be accessed by anyone given the authority, no matter the location or whatever device is being used. This opportunity presented businesses and companies the flexibility to gear their employees toward remote working. As you practice this business trend, you start a substantial environmental help.

Working remotely gives your workers the benefit of escaping the daily commute, which requires them to fuel their cars regularly. With the chance to allow your personnel to work at home or any place that would better suit their efficiency and productivity, you also help the environment by cutting down on fuel emissions.

Even though you have many employees still working for you, you do not have to acquire a big space with your office. You can get a small office space which reduces your consumption of water and electricity.

1. **Saving The Environment By Being Paperless**

Gone are the days where you have to print and store all files received in your email or all of the reports you have prepared for your immediate head. With the innovative features of storing data in the cloud, you do not need large filing cabinets to store your printed copies. Green cloud computing makes it possible for companies and organizations to go paperless.

As long as you are connected on the internet, you can leverage cloud storage options like Google Drive, OneDrive, Dropbox, or SharePoint. These storage options allow you and your whole team to go paperless without sacrificing the entire organization’s functionality. With the ease of use, as these cloud storage options offer drag and drop features for all your files, you can still expect productivity within the whole team or organization even when working remotely.

With the emergence of Adobe Sign or DocuSign, there is no need to print any file for a single signature. These cloud-based technology innovations will allow you to download any document, fix your signature and send it back to whoever needs it without printing any pages and with just the use of your computer.

The use of these green cloud computing tools makes it possible for organizations in different industries to reduce paper product consumption, if not eliminating it. This approach creates a significant impact on the environment as you cut down the need to regularly purchase paper products, shred your documents, or dispose of your files.

1. **Reduction Of Your Power Consumption To Decrease Energy Use**

Reduction of your company’s power consumption does not only mean turning off your computer or your workstation lights when not in use. Though this can make a huge difference, you have to understand the gravity of consumed power when your company runs on-location servers.

After you have logged out, shut down your desktop and make your way home, these on-premise servers need to have a constant power supply to make your servers work. You also need to have a running cooling system 24/7 to avoid your servers from overheating, and disposing of these machines after its shelf life will be even another thing you need to tackle.

Switching to the cloud can reduce your reliant on these on-premise servers. It means that you also need fewer machines in your office location, thus less space, and cooling requirements, leading to a reduced power consumption rate. Savings from these freed up capital expenditures can be allocated to other environment-friendly projects or business development ventures like enhancing your marketing strategy campaigns.

1. **Dematerialization That Decreases Greenhouse Gases Emissions**

When you opt to have an on-site data center, the materials used to build it goes a long way and produces greenhouse gasses (GHG) on its life cycles. This GHG are emitted as raw materials for your equipment is being produced. The same gases are emitted as the equipment is being assembled and transported to its location. As you use the equipment, more gasses are produced as well as you come in terms of terms.

As you move to the cloud means, you decrease the emission of these gases, and you practice dematerialization. Dematerialization means the replacement of physical products with virtual alternatives. As you begin to rely on cloud services, you shy away from using GHG emitting physical products, which has a significant impact on the well-being of the environment.

Reducing your leverage on physical products like paper, pieces of machinery, equipment, and hardware also decreases the amount of waste garnered when these products call the need for disposal. Green cloud computing even allows you to focus your time and effort on other profitable projects than dealing with mundane tasks like IT works and downtime issues.

Making a data center more environmentally friendly starts with studying your facility's use of power and other resources and identifying potential changes that can make a difference in the usage levels. That can include various steps, such as replacing inefficient technology assets with newer ones or partnering with [green IT](https://www.techtarget.com/searchcio/definition/green-IT-green-information-technology) vendors to help you create a more sustainable data center.

The overall amount of [energy used in data centers](https://www.techtarget.com/searchdatacenter/tip/How-much-energy-do-data-centers-consume) is massive. The U.S. Department of Energy says they consume 10 to 50 times more energy than a typical office building in the same floor space and account for about 2% of the country's total electricity use. And in a September 2022 [report](https://www.iea.org/reports/data-centres-and-data-transmission-networks), the International Energy Agency (IEA) estimated that data centers used up to 1.3% of the electricity consumed worldwide in 2021. In addition, the IEA said data centers and data transmission networks accounted for a combined 0.9% of all energy-related greenhouse gas emissions in 2020.

Owners of data centers are being pressured to take an active role in reducing their carbon footprints as climate change becomes an increasingly pressing global issue -- and as environmental, social and governance ([ESG](https://www.techtarget.com/whatis/definition/environmental-social-and-governance-ESG)) initiatives in companies become a key measuring stick for customers, employees and investors. Reducing the environmental impact of data centers through [green computing](https://www.techtarget.com/searchdatacenter/definition/green-computing) can also be beneficial from a business perspective, by reducing energy and IT costs and contributing to broader [business sustainability](https://www.techtarget.com/whatis/definition/business-sustainability) efforts.

As a result, [developing green data centers](https://www.techtarget.com/searchdatacenter/tip/Considerations-for-sustainable-data-center-design) is now a priority for companies across industries and geographic locations. Here are eight green computing practices you can implement to make your data center more energy-efficient and sustainable, with both environmental and business benefits.

**1. Track your base energy usage**

First, you must know how much power your data center currently uses. Start by tracking overall electricity usage. Then you can dive deeper into the numbers to forecast future use. For example, break your usage down into HVAC, server, infrastructure, network and storage consumption. Once you have a sense of your baseline consumption levels, you can look at [ways to improve energy efficiency](https://www.techtarget.com/searchdatacenter/tip/Four-ways-to-reduce-data-center-power-consumption) through better power management and changes in the data center.

**2. Right-size your servers**

Running all the servers in your data center 24/7 can lead to underutilization. Some servers might only process requests during certain times of the day, while others might run applications infrequently or simply no longer serve a purpose. The result: [higher server energy usage](https://www.techtarget.com/searchdatacenter/tip/Improve-efficiency-with-server-energy-consumption-tools) than you really need. Server monitoring tools like Zabbix, Netreo and Paessler PRTG Network Monitor can help sys admins track utilization to determine functions that can be consolidated onto fewer machines. You can then virtualize some servers to further reduce their physical footprint and decommission others altogether.

**3. Modify the temperature**

Data center HVAC systems tend to be designed to use more air conditioning than is really required now. Newer data center assets can safely run at higher temperatures, so the overall temperature can often be kept a little warmer in order to reduce the HVAC load. Of course, you don't want to end up with excessive heat and humidity that can damage IT equipment, so be sure to properly [calculate your data center's cooling needs](https://www.techtarget.com/searchdatacenter/tip/How-to-calculate-data-center-cooling-requirements) before turning up the thermostat.

**4. Rearrange your data center**

You can increase the efficiency of your data center by rearranging it based on energy consumption and temperature requirements. Use smart layouts such as [hot and cold aisle configurations](https://www.techtarget.com/searchdatacenter/tip/Explore-hot-and-cold-aisle-containment-for-your-data-center) to group warmer assets together and take advantage of HVAC vent placement.

Such layouts require you to understand the locations of your intake and outtake vents in the facility in order to place assets appropriately. You can then place additional units in hotter zones for supplemental cooling and reduce your overall electricity costs and the demands on your HVAC system.

**5. Replace older assets with more efficient ones**

Many legacy data center assets use more power, generate more heat and have lower physical tolerances than newer ones. Newer servers, switches, racks and HVAC technologies typically include processors and other components that are more energy-efficient. Install these new assets when appropriate for your data center, such as during equipment end-of-life and sunset processes or parts replacement and maintenance. Again, you can also replace physical servers with virtual ones -- or move some resources to the cloud -- to cut down on the number of physical technologies you use.

**6. Invest in smart facilities management tools**

IT service management processes require you to gather and store a lot of information about your data centers, including power consumption and data loads. By analyzing that data, you gain insights that can be applied to your environmental control system to optimize asset usage, thus reducing power consumption and HVAC loads.

To help with that, AI-powered monitoring tools can use machine learning to analyze energy data and create a [power usage effectiveness](https://www.techtarget.com/searchdatacenter/tip/How-machine-learning-in-data-centers-optimizes-operations) forecasting model. Some organizations also use AI tools to autonomously manage HVAC functions in their data centers, along with IoT sensors that feed continuous temperature data to the system. The software then analyzes the data and automatically changes the HVAC system to ensure that temperatures remain at optimal levels at all times. In one example, Google used such technology to reduce energy consumption in its data center cooling systems by 40%.

**7. Investigate green energy technologies**

Organizations seeking to reduce the carbon emissions from their data centers can also consider green energy alternatives, such as geothermal cooling, wind power and hydroelectric power. For example, data center services provider Verne Global uses a combination of geothermal, hydroelectric, solar and wind technologies to power and cool its facilities in Iceland and Finland. Similarly, one of services provider TierPoint's data centers in Spokane, Wash., was built with a geothermal cooling system driven by water from an underground aquifer below the facility. Iron Mountain operates underground data centers in Missouri and Pennsylvania that also take advantage of natural cooling.

Check which [green energy options](https://www.techtarget.com/searchdatacenter/feature/Get-started-with-green-energy-for-your-data-center) are available to your organization. The development of new, renewable power and cooling methods means you likely can find ways to lower your data center's carbon footprint.

**8. Partner with green IT vendors and organizations**

Develop business partnerships with IT vendors that offer green technologies, as well as organizations that can help you identify more sustainable IT options.

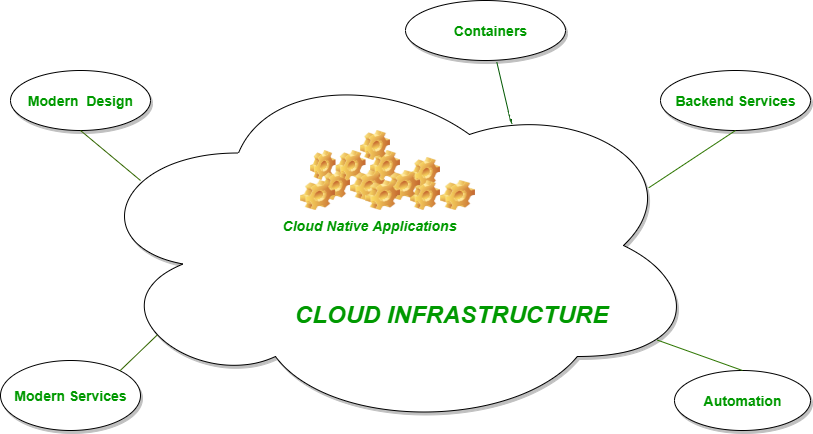
For example, IT teams can use the U.S. government's Energy Star certification program to find energy-efficient computers, monitors and other products. Also, the Global Electronics Council manages a registry of products that meet the criteria of the Electronic Product Environmental Assessment Tool (EPEAT) standard. The registry lists servers, networking equipment, end-user computers and other technologies that are "environmentally preferable," according to the U.S. Environmental Protection Agency, which funded the development of both the registry and the EPEAT standard.

**Overview :**  
Cloud-NativeTechnology is one of the biggest trends in Software Technology. Don’t get confused at all Cloud Computing and Cloud-Native Technologies are not the same but can be considered as quite related.

[**Cloud Computing**](https://www.geeksforgeeks.org/cloud-computing/)**:**  
Clearly, Cloud Computing is termed as delivering of infrastructure platform, storage, databases, software applications as services via the internet. Some well-known providers of cloud services are- [Amazon Web Services (AWS)](https://www.geeksforgeeks.org/introduction-to-amazon-web-services/), [Microsoft Azure Services](https://www.geeksforgeeks.org/introduction-microsoft-azure-cloud-computing-service/), [Google Cloud Platform (GCP)](https://www.geeksforgeeks.org/what-is-google-cloud-platform-gcp/), [IBM Cloud](https://www.geeksforgeeks.org/what-is-ibm-watson-and-its-services/), and many more.

**Cloud-Native :**  
Cloud native is a term that describes applications and services that are designed and built for the**cloud delivery model**[**1**](https://www.bing.com/ck/a?!&&p=0ac77def0eed19a7JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3MA&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cub3JhY2xlLmNvbS9jbG91ZC9jbG91ZC1uYXRpdmUvd2hhdC1pcy1jbG91ZC1uYXRpdmUv&ntb=1)[**2**](https://www.bing.com/ck/a?!&&p=3a0b2823b9f9b6f1JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3MQ&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly9hd3MuYW1hem9uLmNvbS93aGF0LWlzL2Nsb3VkLW5hdGl2ZS8&ntb=1)[**3**](https://www.bing.com/ck/a?!&&p=66f72b084fe97d14JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3Mg&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cub3V0c3lzdGVtcy5jb20vZ2xvc3Nhcnkvd2hhdC1pcy1jbG91ZC1uYXRpdmUv&ntb=1)[**4**](https://www.bing.com/ck/a?!&&p=697769170f1bfa94JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3Mw&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cuY2l0cml4LmNvbS9lbi1pbi9zb2x1dGlvbnMvYXBwLWRlbGl2ZXJ5LWFuZC1zZWN1cml0eS93aGF0LWlzLWNsb3VkLW5hdGl2ZS5odG1s&ntb=1)[**5**](https://www.bing.com/ck/a?!&&p=b58c9ab66c088e6aJmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3NA&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cuc2R4Y2VudHJhbC5jb20vY2xvdWQvY2xvdWQtbmF0aXZlL2RlZmluaXRpb25zL3doYXQtZG9lcy1jbG91ZC1uYXRpdmUtbWVhbi1kZWZpbml0aW9uLw&ntb=1). Cloud native applications take advantage of the cloud's features, such as scale, elasticity, resiliency, and flexibility[**1**](https://www.bing.com/ck/a?!&&p=f088920bec77ec8aJmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3NQ&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cub3JhY2xlLmNvbS9jbG91ZC9jbG91ZC1uYXRpdmUvd2hhdC1pcy1jbG91ZC1uYXRpdmUv&ntb=1)[**3**](https://www.bing.com/ck/a?!&&p=2a09fff5137ab865JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3Ng&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cub3V0c3lzdGVtcy5jb20vZ2xvc3Nhcnkvd2hhdC1pcy1jbG91ZC1uYXRpdmUv&ntb=1)[**5**](https://www.bing.com/ck/a?!&&p=cd3470ef6464e840JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3Nw&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cuc2R4Y2VudHJhbC5jb20vY2xvdWQvY2xvdWQtbmF0aXZlL2RlZmluaXRpb25zL3doYXQtZG9lcy1jbG91ZC1uYXRpdmUtbWVhbi1kZWZpbml0aW9uLw&ntb=1). Cloud native applications are different from cloud-enabled applications, which are not designed for the cloud from the start[**2**](https://www.bing.com/ck/a?!&&p=02056ce9bdd265e0JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3OA&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly9hd3MuYW1hem9uLmNvbS93aGF0LWlzL2Nsb3VkLW5hdGl2ZS8&ntb=1). Cloud native applications can be accessed through an internet connection from any device[**5**](https://www.bing.com/ck/a?!&&p=70e600c951928193JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ3OQ&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cuc2R4Y2VudHJhbC5jb20vY2xvdWQvY2xvdWQtbmF0aXZlL2RlZmluaXRpb25zL3doYXQtZG9lcy1jbG91ZC1uYXRpdmUtbWVhbi1kZWZpbml0aW9uLw&ntb=1). Cloud native can also refer to the approach of designing software applications specifically for cloud architecture[**3**](https://www.bing.com/ck/a?!&&p=36dac4bc712aa031JmltdHM9MTY4MjM4MDgwMCZpZ3VpZD0xYjgyYThjNS1mZWYzLTZjNjUtMDRiNC1iOWZlZmY2ODZkNmYmaW5zaWQ9NTQ4MA&ptn=3&hsh=3&fclid=1b82a8c5-fef3-6c65-04b4-b9feff686d6f&psq=cloud+native+meaning&u=a1aHR0cHM6Ly93d3cub3V0c3lzdGVtcy5jb20vZ2xvc3Nhcnkvd2hhdC1pcy1jbG91ZC1uYXRpdmUv&ntb=1).

Cloud-Native can be described as an approach that builds Software Applications as Micro-services and runs as well as maintains them on a containerized platform to utilize the proper advantages of the cloud computing model., i.e., each organization will have to modernize its infrastructure, processes, and organizational structure while choosing the right cloud technologies as per their respective requirements and user’s total usage.



**Technical Facts :**  
It empowers organizations to build and run scalable applications and also provide feature to build in modern, dynamic environments like in private, public and hybrid clouds. Containers, microservices, immutable infrastructure, and declarative APIs exemplify this approach. Cloud-Native can be stated as a service package of cloud-based processing and cloud-based services bundled together in an expandable environment by service provider enterprises. Cloud-Native Computing uses an open-source software stack to be perfectly balanced with certain criteria as follows.

* All the deployed software applications, processes, packages in the cloud-based environment should be collected in their own authorized containers.
* Perfect optimization of the dynamic orchestration of the cloud software applications, and resources in an active state.
* For the overall easy maintenance and faster approach of the cloud-based applications and infrastructure, the segmentation of working processes is done, this segmentation is known as Micro-services.

**Advantages of Cloud-Native :**

* **Speed –**   
  Faster to deploy than Cloud-based approach as in cloud-native no hardware and software has to be deployed while in the case of cloud computing they are slower because of hardware provisioning or software setup.
* **Reusability –**   
  Since reusable elements, as well as services, constitute the cloud environment, so they can be maintained and reused easily.
* **Reduced Cost –**   
  Since Cloud-native is server-less architecture so reduced cost as compared to a container-based architecture.
* **On-demand Infrastructure –**    
  An invisible infrastructure that is easily portable and can be provided whenever there is a requirement or user demand.
* **Reliability –**  
  Cloud-native is further scalable, flexible, and quite secure which makes it reliable for consumers.

## **Cloud Native Applications**

The Cloud-Native applications are a group of **independent, small, loosely-coupled services**. Cloud-native applications are created for delivering well-identified business value, as an ability to incorporate the feedback of users for extended improvements. In other words, cloud-native applications improvement is a way for speeding-up how we create applications users wish at the pace an enterprise requires.

### Cloud meaning in Cloud-native Applications

If an application is Cloud-native, specifically, it's created for facilitating automated management and consistent development experience across **hybrid, public, and private clouds**. Enterprises use cloud computing for increasing the **availability** and **scalability** of applications. These aspects are accomplished through on-demand and self-service provisioning of various resources. It is also automating the lifecycle of an application to production from development.

However, to completely utilize these aspects, a new way of application advancement is required.

The development of Cloud-native applications is an approach for quickly updating and building applications while reducing risk and improving quality. More specifically, it is a way to run and build fault-tolerant, scalable, and responsive applications anywhere inside the hybrid, public, and private clouds.

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