



# A REVIEW REPORT ON GREEN CLOUD COMPUTING

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## ABSTRACT:

Cloud computing can be a breakthrough field for data and advertising technologies (ICT), presenting new evidence for environmental protection. This technology has a variety of request authorities as they provide adaptability, are reliable and trustworthy, and offer top-to-bottom presentation at a fair cost. The cloud computing rebellion is reshaping modern networks and bringing promising environmental prospects for defense, as well as economic and technological advantages. These technologies have the potential to improve energy efficiency and reduce carbon footprint and e-waste. These topographies can turn cloud computing into green cloud computing. In this survey, we review most of the achievements of green cloud computing. First, an overview of cloud computing is given. Recent studies and developments are then summarized and environmental issues are exactly addressed. This survey is intended to provide an up-to-date guide for research regarding green cloud computing.

**Keywords:** Green Cloud Computing; Green Information And Communication Technologies, Environmental Protection; Sustainability.

## INTRODUCTION

Sustainability has been gaining importance among software and hardware developers and users over the last 20 years, thanks to the rapid increase in energy consumption. The influence of data and communication technologies (ICT) on the environment has been studied throughout their entire life cycle, in order to market green and sustainable developments. These can contribute significantly to the development of the current state of the environment by weakening the negative impacts that have intensified over recent decades. There is great pressure on producers to comply with environmental regulations and develop products and services that minimize negative influences on the ecosystem. According to Hilti et al., the judgment made regarding the sustainable development of ICT and the relationship between these two fields must consider the advantages and disadvantages of the effects of ICT on the environment both in the present and in the future.

The attractiveness of the technologies has, in many cases, led to disuse due to environmental problems by both producers and users. Its degree of maturity, together with the pressure of people determined to

change towards the application of ICT in accordance with the instructions of the environment. It is also clear that there is attention to the observation and preservation of the ecosystem. such as associated costs, lack of time and interest needed to address the challenges of the approaches, lack of responsibility for environmental influences or lack of collaboration between departments within companies (ICT companies and others). Cloud computing, as a subdivision of ICT, is the subject of environmental studies. According to Komi, the energy consumed by data centers in 2010 represented 1.3% of total consumption and estimates an expansion in the proportion of total carbon dioxide (CO<sub>2</sub>) emissions taking into account cloud computing and energy intake, according to a group of researchers from Lawrence Berkeley National Laboratory and Northwestern University developed a demonstration tool called the Cloud Energy and Emissions Research (CLEER) Model.

These server farms form the cloud. The results assess that the earliest energy footprint of email, productivity software, and customer relationship management software could be reduced by up to 87% if all business users, international environmental administrations, in the US. The US has moved to cloud computing. Even if international environmental administrations in the US have opted for cloud computing. The model does not take into account all variables, but it can be useful for achieving energy efficiency in Internet companies' data centers. It could ensure an increase in energy transparency and inform consumers so that they can opt for the simplest offer. According to Wikipedia [wiki], cloud computing is a total meeting of ideas where thousands of PCs are currently interconnected to offer a seamless experience to the user, as if using a single huge resource.

## CONCEPT

Cloud computing has become a crucial paradigm because it provides dynamic, high-capacity computing capabilities, as well as access to rich applications and information archiving, without requiring additional computing resources. These are uses of cloud data centers through virtualization technologies to provide a robust and adaptable computing environment. The idea, generally developed and promoted, has aroused the interest of numerous organizations, mainly thanks to the cost reduction that could be achieved by reducing investment in hardware and software. The important insights of cloud computing are: service-oriented architecture (SOA), microservices architecture, distributed computing, parallel and grid computing, virtualization and containerization. Cloud computing services are enormously dynamic. According to Feininger, the keywords that characterize this novel ICT delivery model come from cloud computing: ubiquitous, service-centric, scalable, power-based and proprietary services. The concept is defined mainly by its characteristics. Cloud computing integrates existing technologies and models to optimize the utilization of physical and logical resources. Resources are treated as services and are available to users according to their requirements. There are three key models: IaaS (Infrastructure as a Service), PaaS (Platform as a Service) and SaaS (Software as a Service). IaaS and PaaS serve individualistic software providers and introducers, while SaaS serves end users. A typology of cloud computing must consider the degree of availability it offers so that it is often classified as private, public, hybrid and/or community (Figure 1).

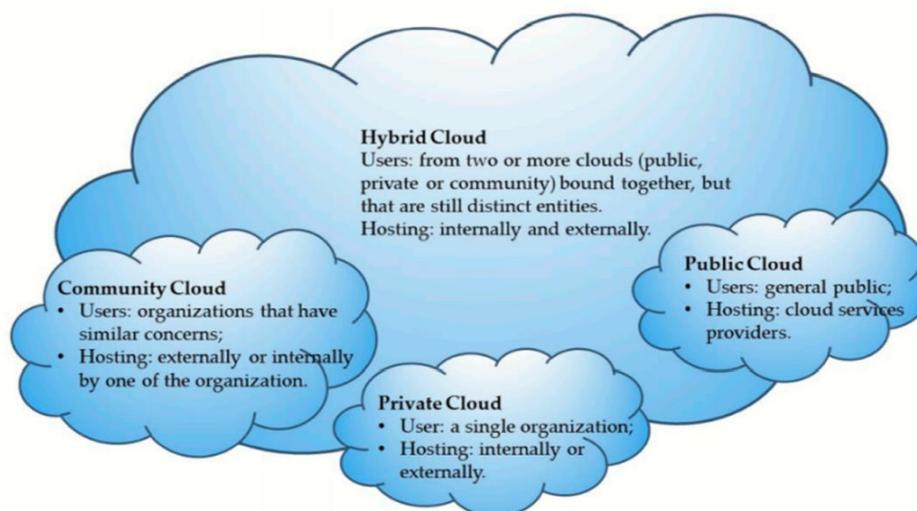


Figure 1. Types of cloud computing.

## GREEN CLOUD COMPUTING IN NON- ACADEMIC STUDIES

The same activities will be performed with less equipment and less energy consumption for both users and green data centers, due to greater resource efficiency. The demand for cloud computing services is expected to continue to increase. The annual carbon reduction is estimated, in the same study, at 85.7 million metric tons, equivalent to 50% of CO<sub>2</sub> emissions. The reduction in energy consumption and necessary hardware is accompanied by a reduction in CO<sub>2</sub> emissions, as well as a reduction in (e)waste. An important role is played by major cloud companies (Apple, Facebook, Google, Amazon, Microsoft, IBM, Salesforce, etc.), which have committed to using only renewable energy in data centers and are showing the first signs to fulfill this promise. The amount of clean energy used by these companies has increased significantly in recent years. Table 3 presents information collected by Greenpeace in 2012 and 2016 on the energy sources used by several of the large cloud computing providers. And so the added benefit of energy is systematic computing in a world of carbon caps and climate legislation makes green IT a necessity from a compliance point of view and maximum quantity from a of operations.” Server power and efficiency are the most important factors in reducing energy consumption.

The advantages and disadvantages are wisely abundant during this case, and knowledge regarding the important influences of cloud computing on the environment is restricted.

### Advantages

- ✓ Reducing Paper Waste

Paper has been a staple in offices round the globe for so many years, but the cloud has dramatically reduced its necessity to make physical documents and files also can be stored and shared within the cloud, improving energy efficiency also as security, as duplicates are often created easily during a backup server.

- ✓ Reducing Energy Consumption

Cloud service wage-earners crowd thousands of servers within their amenities, allowing them to exploit well-organized processes available to them owing to their bulk. The cloud offers a spread of eco-friendly benefits to businesses.

✓ **Take Advantage Of Government Incentives**

If you're noticing a trend of cash saving benefits, it's because it really pays to travel green. This cloud helps to save lots of enterprise funds on its own, but the actual residual effects of cloud adoption also causes price savings. Some incentives for corporate energy efficiency, starting from tax incentives to rebates are also being offered by both the local government and the federal agencies.

**Disadvantages**

✓ **Implementation Cost Is High**

The starting investment for green computing is taken into account to be high by medium-sized and little organizations. Green computing remains not yet affordable to everyone.

✓ **Evolving Technology**

It will be tough to Adapt to this Green cloud computing technology is developing, so it is rather tough used for everybody to familiarise instantly.

**GREEN CLOUD COIMPUTING APPLICATIONS**

Widely green cloud computing is employed within the following areas in organizations

- Management of energy in Data Centres.
- Green Wireless Network.
- Green Parallel Computing with Big Data Network.
- Green computing with an algorithm.

**FUTURE SCOPE OF GREEN CLOUD COMPUTING**

All efforts are important and will produce constructive results. The final winner is the entire society and, therefore, the next generation. Green ICT is extremely important in this field and is considered a solution and a problem for the environment. Green cloud computing is a crucial component of this field. An important part of the research focused on cloud computing security and quality of services. This quality must include both customer satisfaction and compliance with environmental protection requirements. Software design is important for green cloud computing. Applications can improve efficiency and resource management. Communication between software components must be efficient. Virtualization techniques could be enhanced by migrating workloads between machines, along with migrating virtual machines, between geographically distributed data centers. Workloads could be concentrated in green cloud data centers. To solve this problem, the capacity program must be made taking into account the thermal aspects and therefore the heat recirculation must be improved. Building knowledge centers in pieces with free preservation resources can be a non-technical solution to this problem. The “non-technical facets” refer to ethics, internal and international standards related

to the environment, and therefore to the organization's internal policies and methods. Another non-technical issue is the cost of green cloud computing. The use of renewable energy can be a non-technical issue. The intermittency of this power can be a problem facing cloud computing providers and disrupts traditional methods of planning operations within the cloud. To certify that the SLA requirements are met, it is important to use a combination of energy sources that complement each other.

## CONCLUSION

Cloud computing can be a new model that integrates existing technologies to increase the efficiency of resource use. The results of the use of these technologies are varied. The provider of such services and the authors of studies accepted by companies interested in safeguarding the environment have highlighted both favorable and unfavorable aspects of the effects of cloud computing on the ecosystem. This article analyzes the contribution of cloud computing to environmental protection in line with studies on this topic. topic addressed so far. The most important aspects and, as well as the most publicized benefits, are those that call for energy efficiency. To comply with environmental protection regulations, companies providing cloud services should minimize energy consumption from non-renewable sources and replace it with renewable energy consumption. Studies carried out so far have highlighted that the rate of use of clean energy remains quite high, surpassing energy obtained from non-renewable sources and an increase in the consumption of energy from renewable sources will lead to lower CO<sub>2</sub> emissions, but considering that the main indicator It goes without saying that the reductions in carbon emissions have not yet been achieved to meet the expectations of environmental organizations.

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