DOI https://doi.org/10.36719/3104-4735/2/21-25

Shafiga Imanova
Nakhchivan State University
https://orcid.org/0009-0000-7902-888X
shefiqeimanova@ndu.edu.az

Green IT: the Importance of Durable Technologies

Abstract

Green IT is an approach that aims to reduce the negative impact of information technologies on the surrounding environment and to encourage the use of durable technologies. This concept ensures efficient use of energy, reduction of carbon footprint and proper management of electron consumption.

The high energy consumption of information centers and IT infrastructures has a serious impact on the surrounding environment. To minimize these impacts, Green IT applies virtualization, cloud technologies and intelligent energy management systems. In addition, re-purposing of equipment and extending the life of technological equipment deteriorates ecological sustainability.

The benefits of green IT are evident both in the economic and ecological fields: companies benefit from their expenses and at the same time help to protect the surrounding environment. This approach creates opportunities for the use of more ecologically friendly and responsible technology in a long-term perspective.

Green IT plays an important role in society's struggle against ecological problems by ensuring the continuous development of technology.

Keywords: *intelligent energy management, Norway sample, reproduction and waste reduction, energy efficiency, carbon footprint, electron wastes, ecology sustainability, waste management*

Introduction

The rapid technological development of modern times penetrates deeply into every aspect of our daily lives, increasing productivity and comfort. Regardless, the effects of this development on the surrounding environment should not be ignored. Protection of the environment, energy efficiency and the continued use of resources occupy an important place among global issues today. For this reason, the "Green IT" concept comes to the fore in order to ensure the development of technology that is durable and compatible with the surrounding environment. In this article The nature of the "Green IT" concept, the areas where durable technologies are applied and their importance in terms of economy, ecology and society will be discussed. The aim is to investigate how technological processes can be made more ecologically responsible, both at the individual and corporate levels, and to take steps in this direction. It is to evaluate.

Research

The impact of the technology sector on the surrounding environment is wide-ranging and multifaceted. This effect is observed at both production and exploitation levels. For this reason, some researchers approach this issue from several perspectives. Considering the following aspects:

- **Energy Consumption and Carbon Emission**

a) IT infrastructure, mainly information centers and servers, demand large amounts of electrical energy. According to the information obtained from the statistics for the year 2023, approximately 2-3% of the global energy demand will be shared by the IT sector. This results in the emission of a large amount of carbon dioxide (CO_2) into the atmosphere and, of course, accelerates climate change (Figure 1).

Figure 1. Traffic environment and technology

Norwegian example: By expanding the volume of UDM on the account of oil revenues, Norway is able to effectively manage the risks of wastes thrown into the ecology that may be created in the future in parallel with it. they could know. In countries that implement parallel development directions, there are generally no "elusive" economic increases. Tekce can skillfully manage not only to expand the UDM, but also to manage the risks that will arise against the backdrop of its expansion.

Norway aims to achieve carbon neutrality by 2030. With this, Norway expresses its commitment to making important contributions to global climate changes. Norway is committed to sustainable transport through incentives and infrastructure, reducing emissions and improving air quality. Norway also attaches importance to energy efficient buildings and smart urban planning. More significant progress has been made on behalf of unsecured energy sources. The Norwegian government has become one of the global leaders in unsecured energy production. This is a phenomenal state for the resurs country (Talibli, 2024).

- **Electron Trashes (E-trashes)**

As a result of the rapid obsolescence or renewal of technological equipment, millions of tons of technology are created in this sector every year. There are many heavy metals (for example, lead, mercury) and poisonous chemicals in the composition of these deposits, which, if not properly castrated, can form in the soil. and pollutes water supplies.

E-tolls are a type of pollution and belong to groups II and III (medium and high) according to the danger they pose. According to the classification of the International Organization for Standardization (ISO), the electronic equipment group includes electronic devices, equipment and equipment, including computer equipment, as well as electrotechnical (electrical) equipment. and in international terminology, it is briefly referred to as WEEE (Waste Electrical and Electronic Equipment)

- **Consumption of natural resources**

Rare metals and minerals (for example, cobalt, lithium) are required for the production of many technological products (tools). The removal of natural resources leads to the degradation of the surrounding environment, the destruction of trees and the decrease in bioreproductivity. In particular, the detection and extraction of rare earth elements causes serious damage to the surrounding environment.

Ecological information from the historical perspective essentially combines the effective drivers of competitive market value. They stimulate the activity of both the producer and the consumer. At the same time, it allows the tasks posed to be fulfilled within the protection of the surrounding

environment at the lowest cost. The effectiveness of ecological information depends on the implementation of legislative and normative acts by institutions. The principle of "if you make it dirty, you have to pay" confirms that the dirty substances carry full financial liability for the pollution (Nabiyev, 2019).

- **Water Utilization**

A large volume of water is consumed in the production processes of IT sector products. For example, during the production of semiconductor chips, water is used to clean and strip it, which causes the natural water resources to decrease. Green IT water utilization focuses on reducing the water footprint of data centers and electronic manufacturing through efficient cooling technologies and water recycling systems (Koomey, 2011). Implementing water-efficient strategies in IT infrastructure not only supports environmental sustainability but also reduces operational costs in the long term (Shehabi, et al. 2016).

- **Detoxification or recycling of processed IT equipment**

In other cases, the reintroduction of technological products is either not successful enough, or in developing countries, it is implemented by methods that do not comply with hazard-free and ecological standards. This poses a serious threat to the health of the people living in the region and to the ecosystems. Accordingly, in order to reduce the effects of the technology sector on the surrounding environment to the least possible level, the modern IT conditions should be implemented. There is a need to move on to practical and continuous production models.

The application of durable technologies brings benefits in a wide range of ways for both companies and society. It is possible to group these advantages in economic, ecological and social aspects.

1. Economic Advantages

a) Reducing Expenses: Optimizing energy efficiency and resources reduces energy and surgical expenses in the long-term perspective. For example, equipping buildings and information centers with energy-efficient systems creates serious profit opportunities for businesses.

b) New Business Opportunities: Durable technologies enable innovation and the formation of new markets. New sources of income are created for startups and companies operating in the field of green technologies.

c) Increase in Brand Value: The activities of companies that are ecologically responsible gain more social support and customer satisfaction. This causes them to gain an advantage in the market competition.

2. Ecological Advantages

a) **Reduction of Waste:** Reproductive and circular economic models counteract the pollution of the surrounding environment by reducing the volume of waste. Circular economics is based on three principles: reduce consumption, reuse and produce again. This principle aims to reduce the amount of waste produced by minimizing the use of materials and resources in the first place. When uses are unavoidable, they should be used or re-manufactured whenever possible (5).

b) **Reducing the Carbon Footprint:** Resilient technologies play an important role in combating climate change, especially by reducing energy demand and emissions. For example, the use of available energy sources significantly reduces carbon emissions. The protection of natural resources requires the adoption of environmentally friendly technologies and conscious consumption habits in order to achieve sustainable development goals (Chepel, 2003).

During emission calculations, the methodology recommended by the IPCC and determined by level approaches was used. As a result of the calculations, the Carbon Trace of the Salcuqlu district in 2015; It has been determined that there is 0.94 million tons of CO2. Among the emissions that constitute the Carbon Trace of the Salcuqlu district, emissions coming from the range lead with 56%. Then, the largest degradation comes from the use of energy for transportation purposes, at 41%. The bottom emissary source is 3% of the total. It reduces 1.55 tons of CO2 emissions per person in the rayon and 457 tons of CO2 emissions per unit area (km2). When the results are evaluated, the carbon footprint of the region is well below the world average. In addition, as a result of the intensive coal mining works carried out on the rayon land, 612360 tons of CO 2 were retained, which significantly contributed to the reduction of carbon emissions in the rayon (Erguch, 2019).

c) **Protection of Natural Resources:** Successful production and consumption models ensure more responsible use of resources. This helps protect limited resources such as water, energy and goods.

3. Social Advantages

a) **Improving the Health of the Community:** As a result of the reduction of pollution and the application of clean technologies, the quality of air, water and soil improves. This allows to maintain the health of the population and improve the quality of life.

b) **Creation of New Workplaces:** New workplaces are opened in the field of development and application of durable technologies. Increase job opportunities, especially in the fields of energy, recycling and ecological services.

c) **Increasing the Ecological Responsibility of the Society:** The promotion of durable technologies leads to an increase in ecological knowledge and responsibility in the society. This contributes to the creation of a stronger and cleaner environment for future generations.

some cases are clearly explained below :

✓ **Increasing Energy Productivity**

Virtualization Technologies: Reduce the number of physical devices by creating virtual environments for servers and computers. This significantly reduces energy consumption and abstraction demands.

Cloud Computing: Cloud services ensure centralized storage and processing of information. This reduces the energy consumption of individual installations and enables more effective use of resources on a large scale. Cloud computing enables on-demand access to shared computing resources over the internet, offering scalability, flexibility, and cost efficiency for businesses and individuals (Armbrust, et al., 2010). Cloud technologies have revolutionized the way businesses operate, offering many advantages in comparison with indigenous domestic systems. These innovative methods have gained considerable popularity in recent years due to their consistency, agility and determination. By turning cloud technologies into an integral part of modern computing, it offers a range of functions that enable businesses and individuals to approach information technologies (Mardanzadeh, 2024).

Energy-Efficient Equipment: The use of certified equipment that minimizes energy consumption (for example, Energy Star or EPEAT certified devices) saves electrical energy.

✓ **Utilization Optimization of Resources**

Reproduction and Circular Economy: The technology used reduces the waste of repurchasing equipment and minimizes the need for new goods. This significantly reduces the impact of electron particles on the surrounding environment.

Going to paperless information: Numerical syntaxization and electronic signature technologies reduce the need for paper, ultimately detrimental to the protection of documents.

Smart Sensor and Automation Systems: Automation of lighting, heating and abstraction systems in smart buildings optimizes energy and energy consumption. These technologies work only when necessary, eliminating waste.

✓ **Information Management and Analytics**

Big Data Analysis: Information analytics technologies allow enterprises to obtain detailed information regarding energy and reinsurance usage. Based on this information, more productive management strategies can be implemented.

Monitoring in Real Time: Systems that monitor energy consumption in real time detect waste and provide the opportunity for immediate intervention. This docking reduces energy consumption to a minimum level. Real-time monitoring allows for the prompt tracking of system and process status, ensuring timely response to changes (Kuznetsov, 2018).

✓ **Business and Digital Friendship from a Distance**

Teleconference and Distance Work Technologies: Allowing workers to work from a distance reduces energy consumption and carbon emissions associated with transportation. Numerical collaboration platforms create wide opportunities for reducing office space and saving energy.

Conclusion

Green IT environments offer many technology and management aspects to optimize energy and energy consumption. These situations give good results in the protection of the surrounding environment by simply increasing the energy efficiency, both in establishments and among individual users. According to the established energy integrations:

1) Solar - Energy demand: Information centers and facilities increase energy efficiency and reduce carbon footprint by transferring energy to available energy sources.

2) Energy Saving Technologies: Energy saving technologies integrated into IT systems make energy use more balanced and productive. How can he optimize his appetite?

Green IT technologies are of great importance for the modern society in terms of protecting the surrounding environment and effective use of resources. Problems such as energy consumption, electron waste and carbon emissions resulting from the rapid development of the technology sector require resistant solutions. Green IT partners present strategic steps aimed at eliminating these problems. Green IT for enterprises reduces operational expenses, increases competitiveness and improves ecology. It creates great advantages in terms of increasing responsibility. For society, these situations result in preserving ecological pollution, improving health and creating new job opportunities. Therefore, every step taken towards the reconciliation of technology and the surrounding environment creates a more resilient environment. It is important for the future and the clean planet. With the broad application of the green IT concept, it is possible to achieve significant positive changes in both economic and ecological fields.

References

1. Aghayev, B., Aliyeva, K. (2013). Some aspects of the information freedom of electron devices and information carriers. *Information Society Problems*, №1(7), 2013, 67-74, https://www.jpis.az/
2. Armbrust, M., et al. (2010). A view of cloud computing. *Communications of the ACM*. 53(4), 50-58.
3. Chepel, N. (2003). *Ecology and Environmental Sciences*. Palme Publishing.
4. Erguc, R., Sarı, Y., Argun, M.E. (2019). Determination of Carbon Footprint of Konya/Selcuklu District. *Konya Journal of Engineering Sciences* June 2019, DOI: 10.15317/Scitech.2019.199
5. Koomey, J.G. (2011). *Growth in data center electricity use 2005 to 2010*. Analytics Press.
6. Kuznetsov, S.V. (2018). *Monitoring and Control Systems in Real Time*. Infra-M.
7. Mardanzadeh, Y. (2024). Specialties of cloud technologies. *ETM Equipment Technologies Materials*, 22(04):68-82.
8. Nabiyev, U. (2019). *Complementation of fruitful use of nature and ecology-hazardous mechanisms in the Republic of Azerbaijan*. Magistr discertification. https://unec.edu.az/application/uploads/2019/08/N-biyev-Urfan.pdf
9. Shehabi, A., et al. (2016). United States data center energy usage report. Lawrence Berkeley National Laboratory.
10. Talibli, M. (2024). *Carbon emissions and missions in Azerbaijan*. https://turan.az/az/sosial-sahe/azerbaycanda-carbon-emissiyasi-ve-missiyasi-787051
11. https://static.report.az/photo/cb34d6be-d412-3dc6-9e85-6dc0b9c79f9b_850.jpg
12. https://sesgazeti.az/news/economy/1143270.html

Received: 02.03.2025
Approved: 17.06.2025