



Green Information Technology in the Perspective of Green Principles of the *Civil Code* Exploration of Development

Wenhu Jin¹, Jianli Qian^{2,3*}, Junshun Su¹, Xiaojian Deng⁴, Jin Deng¹

¹*Xi'ning Natural Resources Survey Center, China Geological Survey, Xi'ning 810000, Qinghai*

²*Xi'an Mineral Resource Survey Center, China Geology Survey, Xi'an 710000, Shan'xi*

³*School of Environment, China University of Geosciences (Wuhan), Wuhan, 430074, Hubei*

⁴*Yantai Coastal Zone Geological Survey Center, China Geological Survey, Yantai 2640041, Shandong, China*

*Corresponding author. Email: 1228143523@qq.com

Abstract:

Since the 18th National Congress, the Party and the State have incorporated the construction of ecological civilization into the overall layout of the socialist cause. However, with the rapid development of my information technology business, information technology caused by energy consumption is rising year by year, and China's ecological civilization is not compatible with the strategic thinking, so the concept of green information technology is particularly important. In this paper, from the perspective of the Green Principles of the *Civil Code*, the concept of the Green Principles of the *Civil Code* is always implemented in the whole process of information planning, construction, operation and maintenance, and end-of-life recycling to realize the strategic path of sustainable development of green information technology.

Keywords: *Green Information Technology; The Civil Law of the People's Republic of China; carbon peaking and carbon neutrality goals, Full Process; Development Strategy.*

1. INTRODUCTION

With the goal of "double carbon" becoming another goal of China's efforts to help build an ecological civilization, "green development" has become the direction that many industries must consider on the road to development. In 2022, China officially enters the fast track of the 14th Five-Year Plan, and "accelerating digital development and building digital China" becomes the new strategic goal of China's information development in the 14th Five-Year Plan period. At present, the rapid development of China's information technology construction like a mushroom, especially cloud computing and Internet of Things technology has been at the forefront of the world, but in the progress made, we should also see that the rapid development of front-end technology, inseparable from a huge industrial chain behind. In this paper, by analyzing the concept of green principles of the *Civil Code*, on the basis of which, the author puts forward proposals for thinking about the development of green information technology in the new era.

2. GREEN INFORMATION TECHNOLOGY OVERVIEW

2.1 Concept

Zhou Hongren, the former executive deputy director of the National Information Expert Advisory Committee, pointed out that "to embrace the energy revolution in the context of carbon neutrality, green information should be developed". As a booster to promote industrial development, information technology has been combined with various industries and formed a huge scale, but the energy consumption caused behind the huge scale cannot be ignored. Therefore, in the context of the "double carbon" goal, "green information technology" was born.

The green information technology mentioned in this paper mainly refers to the whole process of planning, construction, operation, maintenance, recycling and disposal of information technology, implementing the concept of green development, upholding the principle of energy conservation and environmental protection, and

forming a new industrial chain of energy conservation and environmental protection.

At present, green information technology is a concept, neither industry standards, nor construction specifications, in the process of implementing the development of green information technology, failed to form an effective grip to promote, resulting in green information technology only stays in the concept stage.

2.2 Demand Analysis

In 2021, More than 10 domestic provinces have announced "pulling the plug to limit electricity", The shortage of electric energy has led to the shutdown of

enterprises to become an urgent solution to the contradiction between supply and demand. According to the statistics of the China Data Center Report 2021, By the end of 2020, China has become the second largest IDC (Internet Data Center) market in the world, with data centers accounting for approximately 2.7% of China's electricity consumption. In terms of data center operating costs (OPEX), electricity and depreciation costs, on the other hand, account for more than 70% of operating expenses. Among them, power costs account for as much as 57%, with major power consumption coming from IT equipment, cooling systems, power distribution, lighting and other consumption. See Figure 1 shows.

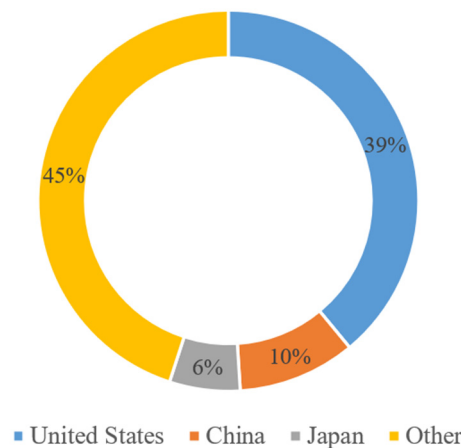


Figure 1 Global IDC Market Share

According to the report Decarbonizing China's Digital Infrastructure: Data Center and 5G Carbon Reduction Potential and Challenges, the growth rate of 5G energy consumption will be 345% and the growth rate

of 5G carbon emissions will be 192% by 2035. Data center energy consumption growth is 199%, and data center carbon emissions growth is 59%. See Figure 2 shows.

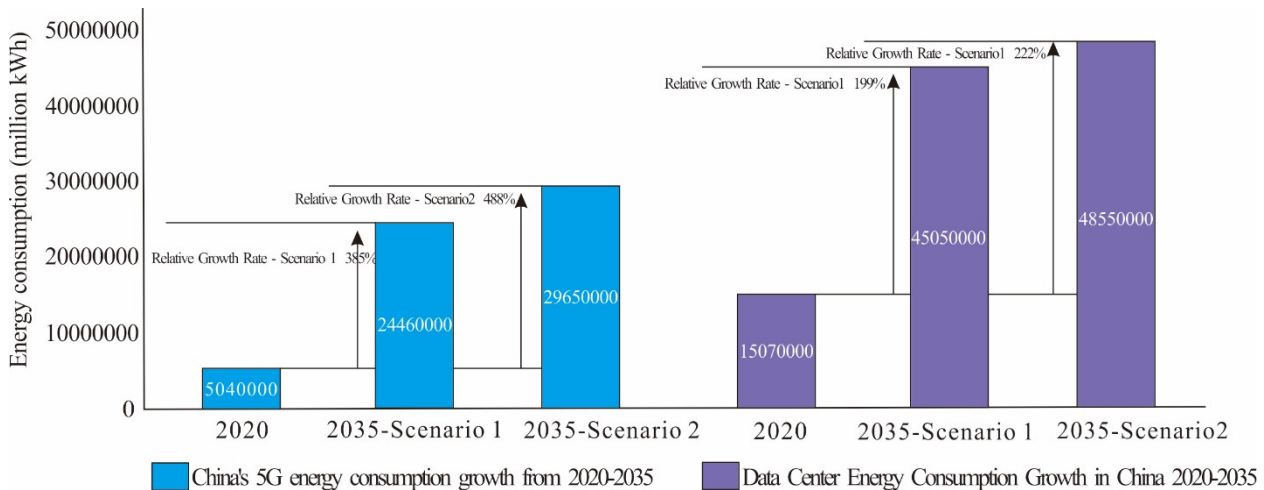


Figure 2 Basic overview of 5G and data center energy consumption

This shows that the carbon emissions and energy consumption of China's digital infrastructure are staggering, and with the continuous development of information technology construction, the scale of data

center construction is showing a rapid increase. Therefore, in the face of the development of information technology and power energy shortage of contradictory issues, the

implementation of the concept of "green information technology" development is urgent.

3. GREEN PRINCIPLES IN THE CIVIL CODE

On May 18, 2020, the Third Session of the 13th National People's Congress deliberated and adopted the Civil Code of the People's Republic of China (hereinafter referred to as the Civil Code). The Civil Code opens with the Green Principle in Part I, General Provisions, which establishes a "high pressure line" for civil subjects to engage in civil activities that cannot be crossed. The Green Principles are the first Chinese law named after the "Code", which responds to the ecological restoration and environmental protection issues brought about by ecological degradation and environmental pollution, with obvious advancement and creativity.

The so-called "green principle" is specifically stipulated in Article 9 of the Civil Code, which states that "civil subjects shall engage in civil activities that are conducive to the conservation of resources and the protection of the ecological environment". As one of the basic principles of the Civil Code, the Green Principle inherits China's ancient thought of "the unity of nature and man" and "the way of nature", and "respect for nature", "fear of nature" and "protection of nature" are always in the Civil Code, reflecting the objective law that man and nature cherish each other.^[1]

3.1 Green Principles in the Civil Code

Article 294 of the Civil Code states that "A person entitled to the real rights in immovable property may not, in violation of the regulations of the State, discard solid wastes or emit harmful substances such as atmospheric pollutants, water pollutants, soil pollutants, noises, light radiation, and electromagnetic radiation." The purpose of this provision in the Civil Code is to regulate the rights of neighboring rights holders and to deal with neighboring relations on the principle of "fairness and reasonableness" and "convenience of life". The civil subjects don't satisfy its own development needs at the expense of the interests of other neighboring rights holders.

Article 509 of the Civil Code states that "The parties shall avoid wasting the resources, polluting the environment, or damaging the ecology in the course of performance of the contract." The purpose of this provision in the General Provisions of the Civil Code is to require civil subjects to take the green principle as a "red line" that cannot be crossed in the formation of this most common civil legal relationship, and to avoid behavior that is contrary to natural ethics.

Chapter 7 of the Tort Liability Division of the Civil Code uses seven legal provisions to specify the liability and legal consequences of causing environmental

pollution and ecological damage from the perspective of private law. In contrast, the Environmental Protection Law, as amended in 2014, does not directly provide for a compensation system for environmental pollution damage.^[2] By adding the issue of environmental tort to the tort liability of the Civil Code, the legislator is regulating the environmental tort as a typical tort liability. And in specific environmental tort disputes, they are usually tried according to civil trial procedures, so this more fully illustrates the weight of environmental torts in the Civil Code.

3.2 Green principles important role and significance

The Civil Code, as a private law, is important in guaranteeing the effectiveness of green information technology on the ground. In the whole process of planning, construction, operation, maintenance, recycling and disposal, information technology can realize the real demand of energy saving and emission reduction, and we can protect ecological environment in accordance with the development concept of "green information technology". In the case of public welfare institutions, for example, according to Article 256 of the Civil Code, "A public institution established by the State has the right to possess and use the immovable and movable property directly under its control, and to benefit from and dispose of such property in accordance with law and the relevant regulations made by the State Council." The Civil Code regulates the procurement, possession, use and disposal of information technology equipment by legal entities in their capacity as civil subjects. Thus, it is clear that in public welfare institutions, information technology construction should and must comply with the content stipulated in the Green Principles of the Civil Code to promote the green information technology concept to take root.

In April 2021, General Secretary Xi Jinping made a solemn declaration to the world at the Leaders' Climate Summit that China will strive to achieve peak carbon by 2030 and carbon neutrality by 2060. As one of the hot words in 2021, "double carbon" reveals China's determination and confidence in accelerating the building of a community of human destiny. As a new face in the overall layout of ecological civilization construction, "double carbon" has become another ultimate goal of building green water and green mountains. As a guide for civil activities, the Civil Code is of great importance in guiding civil entities to achieve the "double carbon" goal. The Green Principles advocate resource conservation and environmental protection in the General Principles, it can provide directly guidance to civil subjects' specific civil activities. The prohibition of the green principle in the Civil Code to limit the excessive expansion of private rights fully highlights the positive role conducted by private law in protecting the ecological environment.

4. SUGGESTIONS FOR THE DEVELOPMENT OF GREEN INFORMATION TECHNOLOGY FROM THE PERSPECTIVE OF GREEN PRINCIPLES IN THE CIVIL CODE

Taking the whole process system of data center construction as an example, the concept of "green information technology" can be implemented in all the elements of the whole process.

4.1 Requirements analysis phase

It is estimated that by 2020, the total number of racks in the national data center will be about 4.286 million. It is expected that by 2035, the total number of racks in the national data center will be about 14,911,000.^[3] As a major energy consumer in the information technology chain, the advantages such as large storage capacity and the ability to achieve effective data integration are obvious, so it has become the choice of many units. But in practice, we can also soberly see that the scramble to build first causes redundancy in data centers. In the requirement analysis phase, for whether to build a data center? What can the data center bring to the construction and development of the unit? Does the unit have the capacity to support the maximum role of the data center? All of these issues should be taken into consideration. You can't just pursue performance and cause a waste of resources.

4.2 Construction and Operation Phase

In the early stages of construction, a large amount of equipment needs to be purchased. According to Article 619 of the Civil Code: "A seller shall deliver the subject matter in compliance with the packaging method as agreed in the contract. Where there is no agreement between the parties on the packaging method or the agreement is unclear, if the packing method cannot be determined according to the provisions of Article 510 of this Code, the subject matter shall be packed in a general way, or, in the absence of a general way, in a manner sufficient to protect the subject matter and conducive to saving resources and protecting the ecological environment." In the process of packing, mailing and transporting the purchased equipment, we should comply with the provisions of Article 619 of the Civil Code, do not use excessive packaging material specially which is harmful for the environmental protection and recycle disposal for the sake of taking the implement of the green principles into the information technology construction.

During the construction of a data center, temperature control systems are essential to prevent damage to servers, switches and other precision equipment due to high temperatures during operation. With the development of

modern information technology, the scale of data centers is expanding, the equipment is increasing, and the load and heat dissipation are soaring. Therefore, simply increasing the number of air conditioning systems or increasing the cooling capacity instead increases the energy consumption of the server room.^[4] Currently, data centers can use the following cooling facilities and technologies to maintain a stable operating environment for precision equipment in the server room. One is the fresh air integrated precision air conditioning system, the second is the liquid cooling technology,^[5] and the third is Dynamic regulation technology of cold volume based on The Internet of Things.^[6] During the operation and maintenance phase, First, by implementing monitoring of device resource utilization, we can reduce inefficient use of resources by removing invalid resources and releasing storage space in a timely manner. Secondly, through good models and mechanisms, we aim to achieve efficient use of data, reduce data redundancy in a timely manner, avoid duplicate data collection, achieve accurate use and efficient mining, and greatly reduce the extra energy overhead in the process of data collection and storage.^[7] Through a series of new means, new technologies and new methods, we realize a new mode of green information from inside to outside, providing an effective impetus to save energy and reduce energy consumption, and helping to achieve the goal of "double carbon".

4.3 End-of-life recycling stage

According to statistics, the life span of a computer under normal use is 8-10 years, and that of a server is 5-8 years. According to the total number of racks of 4,286,000 data centers counted in 2020, an average of 4 servers are installed on each rack. Under the assumption of no new addition, if these servers are scrapped, according to the weight of 10kg per server, 171,440,000 e-waste will be generated. Therefore, it is equally important to enhance the recycling and reuse of e-waste.

For electronic waste, for recycling enterprises, they should use new technologies and new methods to improve the recycling efficiency of used electronic products and handle toxic and harmful electronic originals carefully. According to Article 294 of the Civil Code, "A person entitled to the real rights in immovable property may not, in violation of the regulations of the State, discard solid wastes or emit harmful substances such as atmospheric pollutants, water pollutants, soil pollutants, noises, light radiation, and electromagnetic radiation." Therefore, enterprises in the recycling process of electronic waste, but also to always comply with the law, do not shift the point of conflict.

5. CONCLUSIONS

With the acceleration of the development of information technology, "green information technology" will become the concept of industry development should follow, and in the context of the country to achieve universal poverty alleviation, the people's demand for the spiritual enjoyment of green water and green mountains will be higher and higher. The green principles of the Civil Code will be applied to the whole chain of information construction, and the information industry will be used as a grip to help achieve the goal of "double carbon" and the win-win situation of "green mountains" and "silver mountains".

REFERENCES

- [1]Lu Z X,Zhao T W . The advanced nature of the Green Principles of the Civil Code[J].Journal of Hebei Institute of Environmental Engineering,2021,30 (03) :1-4.
- [2]Liu C X. (2002). On the Realization of Green Principles in the Civil Code Contracts. Legal Science[J]. 2018,36 (06) : 131-140
- [3]Saipo Testing Center. Decarbonization of China's Digital Infrastructure - Data Center and 5G Carbon Reduction Potential and Challenges. 20.
- [4]Xiang J Z, Tang X G.Application of fresh air precision air conditioning system in data center.Intelligent Building and Smart City.2021, (11) 91-92
- [5]Xiao X W.Research progress of data center liquid cooling technology application.Heating, ventilation and air conditioning[J]. 2022, 52 (1) 52-65.
- [6]Shen X H. Research on data center cooling dynamic regulation technology. Yangtze River Data Communications. 2021,34 (11) 158-160.
- [7]Luo K D. Analysis of strategies to achieve green and low-carbon development by information. Oil & Gas & New Energy.2021,33 (03) 55-58.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

